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PESTICIDES ABSTRACTS (formerly Health Aspects of Pesticides Abstract Bulletin) is a monthly publication of the Technical Services Division of the Office of Pesticide Programs, Environmental Protection Agency.

The purpose of this publication is to foster current awareness of the major worldwide literature pertaining to the effects of pesticides as defined in the Table of Contents. The publication represents a monthly review of more than 2,000 primary and secondary sources. A list of periodicals from which articles have been abstracted appears annually in the January issue. Subjects and authors of abstracted articles are cross-referenced in quarterly and annual indexes. Reprint requests should be directed to the author of the complete article.

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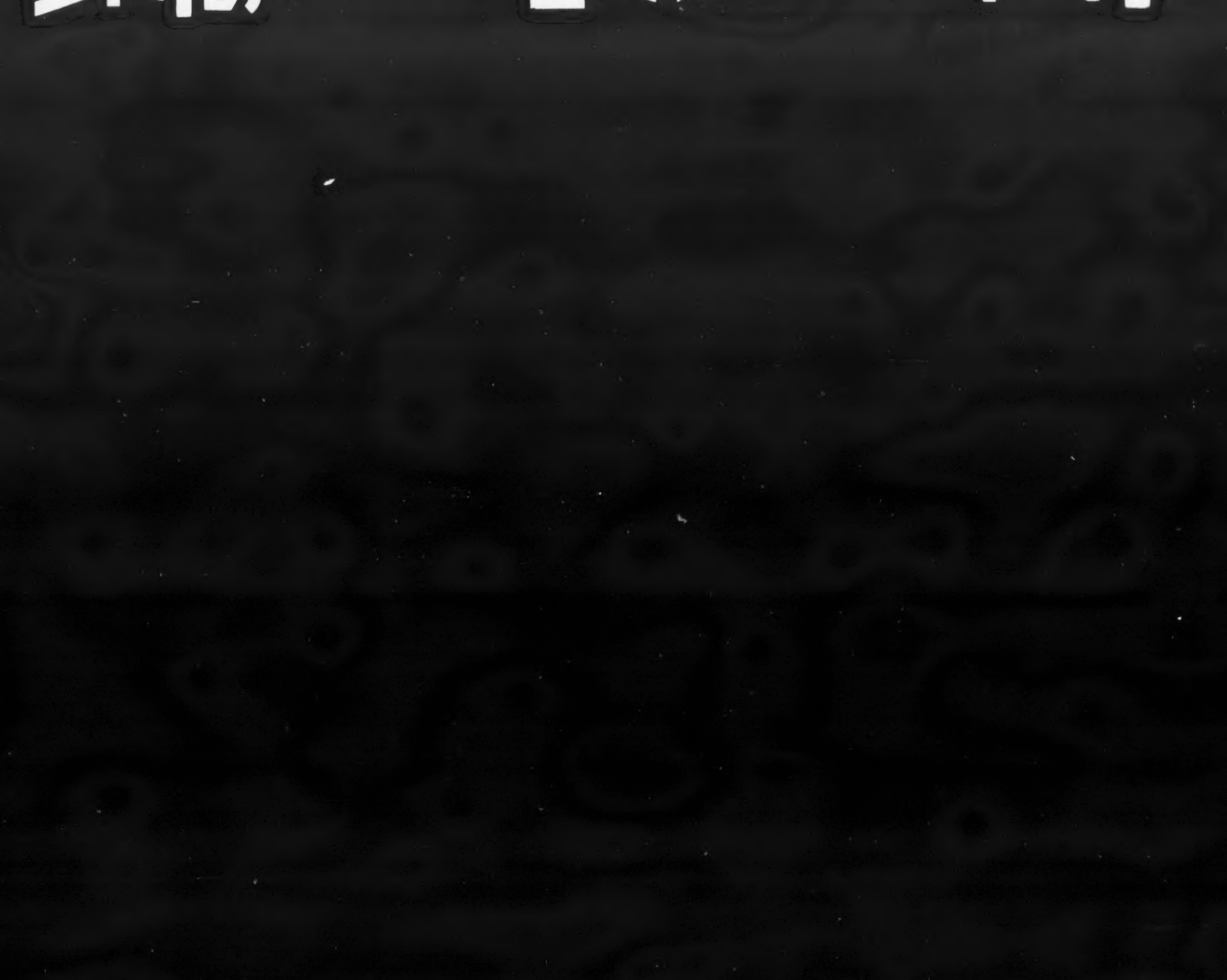

74-1013. Wellenstein, G. (Author address not given). **Der Forstschutz im Zeitalter des Umweltschutzes. [Forest protection in the era of environmental protection.]** *Allg. Forst. Jagdztg. 144(4): 69-75; 1973.* (30 references) (German)

General problems of forest protection resulting from use of herbicides and other pesticides in sylviculture, and short-term and long-term effects on the biosphere and on humans are surveyed. Environmental pollution and the preservation of healthy forests near urban and industrial areas with their harmful emissions are problems of top priority in forest management in European countries. Persistent organochlorine pesticides should not be used in forestry due to their accumulation in the ecosystem especially through trophic chains, but also due to their general toxic and teratogenic effects. Teratogenic effect of kelthane (dicofol) and 2,4,5-T was ascertained in tests on mice. 2,4,5-T itself may be carcinogenic as are dioxins. Albino rats and their three subsequent generations fed 2,4-D-treated tomatoes and potatoes exhibited significant changes in the organ weight (liver and spleen). Pesticides should not be applied in water protection zones and in forests near residential areas unless serious losses of whole stands are expected. Alternative measures of biological pest control by pathogens and attractants, site improvements by auxiliary species, soil working, and appropriate fertilization will be used in the future.

74-1014. Hanf, M. (BASF AG, Landwirtschaftliche Versuchsstation, Limburgerhof, Germany). **Moegliche Gefaehrdung der Umwelt durch Pflanzenschutzmassnahmen. [Possible threat to the environment through the use of pesticides.]** *Anz. Schaedlingsk. Pflanz.-Umweltschutz 46(7): 97-104; 1973.* (5 references) (German)

The general hygienic and environmental problems arising from the ever-increasing use of pesticides in West Germany are discussed. Insecticides amount to only 5% of all pesticides used. Almost two thirds of the products are herbicides, and the rest are fungicides which are usually broken down rapidly in plants and the soil. Following application of persistent compounds, residues can be expected in only 3-4% of the total land surface, i.e., 5-7% of the farmland. A large proportion of crops treated with pesticides are not intended for direct human consumption, but are used as animal fodder. Any residues occurring here are of no significance to man. Residue analyses of plant produce revealed that in only a very few cases was the tolerance level exceeded. This does not, however, incur any risk, as the tolerances are well below the acute toxic levels (by using a safety factor usually of 100 for the determination of the maximum allowable concentration from the no-effect level as established in animal tests), and as prolonged consumption of the same crops treated with the same pesticides is unlikely. Experience has shown that there is no risk to plant produce and soil if pesticides are applied properly.

74-1015. Merian, E. (Sandoz AG, Direktionskomitee, Basel, Switzerland). **Umweltforschung ueber halogenierte Kohlenwasserstoffe, Pestizide, PCB. [Environmental research on halogenated hydrocarbons, pesticides, and PCBs.]** *Chem. Rundsch. 26(42): 3, 5; 1973.* (German)

Studies conducted in the USA and Canada on residue analysis and on the environmental effects of halogenated hydrocarbons, pesticides, and PCBs are reviewed. Gas chromatography, mass spectrometry, gas-liquid chromatography, and NMR spectrometry are among the principal methods currently used for residue analysis and metabolic studies. Budget calculations for DDT revealed average DDT concentrations of about 70 parts per trillion in the air, 15 ppt in the oceans, 0.1 ppm in farm plants, 0.001 ppm in other plants, 1 ppm in marine plants, 1 ppm in terrestrial animals, and 0.7 ppm in aquatic animals. Actually, oceans contain less DDT than expected from the calculations. Possibilities of the biological, bacterial decomposition of halogenated hydrocarbons and pesticides, such as that of carbamates by carbamase-producing bacteria, are being studied. Certain soil microorganisms were able to decompose pesticides and PCBs.

74-1016. Milhaud, G.; Pinault, L. (Ecole Nat. Vet., Lab. de Pharmacie et Toxicol., Alfort, France). **Les pollutions par les substances organiques. [Pollution by organic substances.]** *Gaz. Med. Fr. 79(40): 7637-7644; 1972.* (French)

General problems and hazards of soil and water pollution and of the contamination of foods by organic substances, including pesticides, are surveyed. Organochlorine pesticides, such as DDT, lindane, and heptachlor, are highly persistent in the soil. The time necessary for 95% degradation of heptachlor, lindane, and DDT in the soil was 3-5 yr, 3-10 yr, and 4-30 yr, depending on the soil type. Fish and other aquatic organisms are highly sensitive to pesticides in the water, which is demonstrated by instances of massive fish deaths due to DDT in Canada and to endosulfan in the Rhine, as well as by the very high DDT and mercury concentrations in clams, oysters, and fish, especially tuna. The acceptable daily intake of pesticide residues in foods should be determined with respect to the consumption of contaminated food for a very long period of time.

74-1017. Krotkov, F. G.; Terman, A. V. (Central Inst. Post-Grad. Physicans, Moscow, USSR). **Kontseptsiya priyemlevogo riska i gigiyenicheskoye normirovaniye. [The concept of acceptable risk in hygienic standard setting.]** *Gig. Sanit. 38(10): 88-92; 1973.* (Russian)

General problems of the definition and adoption of acceptable risk in hygienic standard setting for various environmental pollutants and contaminants are discussed. Hygienic standards should be based on both hygienic and social criteria and the risks involved in

pesticide use or abandonment. This especially applies to DDT, a prominent means of controlling malaria, since DDT persists and accumulates in the environment. An acceptable risk should be allowed for in hygienic standardization. A risk is defined as acceptable if it does not go beyond the limits of the natural fluctuations of those biological effects with which an agent or factor to be standardized is associated or compared.

74-1018. Aggarwal, P. K.; Sud, R. K.; Gupta, K. G. (Dept. Microbiol., Panjab Univ., Chandigarh, India). **Effect of pesticides on the methylene blue reduction test in milk.** *J. Dairy Sci. 56(12): 1562-1564; 1973.* (12 references)

The effect of various pesticides on the methylene blue reduction test of milk was studied. Phosphamidon DDVP (dichlorvos), dimetilan, 1-naphthol, NaDDC (DEDTC), Baygon (propoxur), isolan, pyramat, and amidithion in raw milk did not affect the reduction time compared to the control. Sevin (carbaryl) and pyrolan (1-phenyl-3-methyl pyrazolyl-(5)-dimethyl carbamate) in milk increased the reduction time slightly but not significantly. Thiram (tetramethylthiuram disulfide) increased the reduction time at .05 μg/ml or above, but this pesticide did not significantly affect bacterial growth in milk.

74-1019. Anonymous. (Author address not given). **Pesticides—friend or foe!** *J. Environ. Health 32(4): 406-408; 1970.*

Some form of pesticide is necessary to protect crops and livestock from fungi and insects, and DDT is the cheapest, safest, and most effective weapon available against malaria mosquitoes. However, some pesticides, particularly DDT, may have potentially adverse effects on humans and wildlife. The danger of DDT is twofold: it is not broken down in the soil or metabolized by plants or animals; and it concentrates in the fatty tissues of animals. In addition, it is becoming less effective as insects develop resistance to it. Because of the immediate impracticality of the many alternatives which have been proposed for the use of DDT, it will probably be necessary to develop new chemical pesticides which are biodegradable and are specific for a given target. Sweden is the first country to ban DDT, and the states of Michigan, Wisconsin, and Arizona have followed suit. Numerous bills have been introduced into Congress to ban the pesticide or limit its sale and shipment. Some form of limitation on the use of DDT will probably result. In the meantime, health considerations indicate caution in its use. Various agricultural practices can cut down on the need for its use; precautions should be taken to see that it is not overused; and proper cooking methods can remove some DDT from the tissues of fish.

74-1020. Harris, C. R. (Res. Inst., Canada Dept. Agr., London 72, Ontario, Canada). **Insecticides—past, present and future.** *Manitoba Entomol. 5: 17-18; 1971.*

Hailed in the past as extremely beneficial to man, DDT and the other synthetic organic insecticides are now recognized as harmful substances which have caused serious environmental side effects. However, since biological control cannot presently handle the majority of pest control problems, chemical insecticides will continue to be heavily relied on to control insect pests for at least the next 10 to 20 years. More stringent regulations concerning pesticide use are therefore required, and research efforts will have to be vastly expanded if narrow spectrum insecticides are to be developed for future use. These measures will require the cooperative efforts of industry, government, the universities, and impartial and informed individuals, specifically, trained entomologists. (Material presented at the 20th Annual Meeting of the Entomological Society of Canada and the 26th Meeting of the Entomological Society of Manitoba).

74-1021. Wilhelmson, G. (Karolinska Inst., Avdaling for Tillampad Mikrobiologi, Solna, Sweden). **PCB—forekomst och nedbrytning. [PCBs—occurrence and breakdown.]** *Mod. Kemi 11: 35-38; 1973.* (15 references) (Swedish)

Studies on the occurrence, origin, transport, cumulation, and breakdown of PCBs are reviewed. Toxicity of PCB decreased with increasing degree of chlorination in rats and flies, but increased in pheasants and other birds. The toxicity of PCBs may be due to the presence in them of polychlorodibenzofurans. The maximum allowable concentration of high- and low-chlorinated PCBs in the air has been set at 1 mg/m^3 and 0.5 mg/m^3, respectively. The half-life period of PCBs in the soil is estimated at five years. Aquatic invertebrates and fish accumulated PCBs in concentrations 3,000-70,000 times higher than those in the water. Ichthyophagous birds accumulate PCBs even further. Photolytic degradation of PCB in natural environment was observed. The chemical breakdown is estimated to be negligible. Low-chlorinated PCBs, with up to four chlorine atoms in their molecules, are rather rapidly broken down by microorganisms. Gamma irradiation broke down PCBs in alkaline alcohols.

74-1022. Beitz, H. (Biol. Zentralanstalt Berlin der Akad. der Landwirtschaftswissenschaften der DDR, Inst. fuer Pflanzenschutzforschung Kleinmachnow, Kleinmachnow, DDR). **Aktuelle rueckstandstoxikologische Probleme und ihre Loesung. [Current residue-toxicological problems and their solution.]** *Nachrichtenbl. Pflanzenschutzdienst DDR 27(10): 197-201; 1973.* (15 references) (German)

General problems of the hygienic standardization of pesticide residues in food products are outlined. Studies on the possibility of substituting other, environmentally less problematic pesticides, for DDT and studies on the significance of organomercurial fungicide residues

in the crops and the soil are described. Continual updating of existing tolerance lists for food products; elaboration of tolerance lists for animal feed, water, air in residential areas and in workplaces; specification of waiting periods before harvesting; and standardization of analytical methods for the determination of residues of plant protection agents and growth regulators in food products, animal feed, and water are required for an effective hygienic control of pesticide residues. Various pesticide preparations and possible substitutes for DDT were tested for persistence in pea cultures. Lindane, butonate, trichlorfon, dimethoate, imidan, and methyl parathion were highly efficient and had relatively low persistence in the soil as well as in pea plants and seeds. The ban imposed on the use of organomercurials as seed dressing agents in various countries is considered unnecessary since no significant difference in the mercury levels in grains grown from dressed and undressed seeds due to the absorption of natural mercury resources from the soil was determined.

74-1023. Kurys, J. G. (Pestic. Control Serv., Ontario Ministry of the Environment, Toronto, Ontario, Canada). **Pesticides and the environment.** *Ontario Ministry of the Environment, Information Services Branch, Toronto, 1972, pp. 1-19.* (11 references)

Pesticides generally do not pose a direct threat to the health of man although long-term effects of low levels of many compounds have not been determined. Aquatic and soil organisms are most directly affected, and accumulation of certain organochlorine pesticides in the food chain has resulted in death or failure of reproduction in several species of birds. Although proper handling of pesticides has prevented a good deal of environmental contamination, these chemicals are carried in water and in the atmosphere, some persisting and others degrading. Alternative methods of control are being investigated, but these will not entirely replace the chemical methods. Safe use of the least toxic material that will do the job is advised.

74-1024. Martin, G. G. (Pan Amer. Health Organ., Washington, DC). **The interrelationships of malaria, agriculture, and the use of pesticides in malaria control.** *Pan Amer. Health Organ. Sci. Publ. 256: 44-52; 1973.* (19 references)

The control of malaria by DDT in many parts of the world is a significant example of the way in which insecticides can promote better health and economic well-being. Vector resistance to insecticides and environmental considerations, however, prevent them from being a universal solution to insect control. Resistance is an inherited characteristic, and the rate of selection for resistance depends primarily on the resistant character's degree of genetic dominance and the amount of selection pressure. There are some indications that if agricultural spraying of DDT were discontinued for sufficient time in some areas, the currently resistant vector might again become susceptible. DDT is the only insecticide effective enough and economical enough to be used in large-scale malaria eradication programs. The spraying of dwellings with this chemical has not proved to be a hazard to man or the environment.

74-1025. Sharman, R. S. (Pan Amer. Health Organ., Washington, DC). **Pesticides and livestock health.** *Pan Amer. Health Organ. Sci. Publ. 256: 53-65; 1973.* (7 references)

Man has made a deliberate choice to alter the balance of nature through the use of pesticides in food production. He will also have to evaluate and adjust the balance of risk. Since 1945, many areas of food production and human health have become dependent on the use of chemicals. Although alternative controls are being used and developed, pesticide use is expected to grow. Monitoring studies have shown that human accumulation of residues is generally significant only with the organochlorines. The major sources of these residues are meat, fish, poultry and dairy products. The reduction of consumption of contaminated feed has been suggested as the most effective means of reducing eventual human intake of such residues. Animal studies have shown that withdrawal of contaminated feed results in a gradual reduction of the body burden of organochlorines and residues in milk. Ministries of Agriculture in each country are encouraged to establish educational programs and participate in international decision-making in the area of food standards in order to promote efficient, safe use of pesticides.

74-1026. Yost, J. F. (Agr. Res. Development, Cyanamid International, Princeton, NJ). **Pesticide research and development.** *Pan Amer. Health Organ. Sci. Publ. 256: 66-73; 1973.*

Once biological activity of significance has been found for several prospective pesticides, comparative field evaluation is made, and initial information is obtained on the phytotoxicity and animal toxicity, persistence of residues, and possibility of resistance problems with these leads. Most of the toxicology and metabolism studies, however, are performed in the product development phase, after a candidate has been evaluated, and government registration is sought. This is the most expensive phase of research and development, and generally about five years elapse between the decision to develop a product and actual marketing. The fate of the chemical in plants, animals, soil, and water is determined, and the toxic properties of significant degradation products are investigated. Acute, subacute, and chronic toxicity studies in rodents are always performed, and potentiation and demyelination studies are included in the case of organophosphates. There are generally special studies on selected wildlife species and economically important animals, birds, and fish.

74-1027. Harris, C. R. (Res. Inst., Canada Dept. Agr., London, Ontario, Canada). **Insecticide pollution and soil organisms.** *Proc. Entomol. Soc. Ont. 100: 14-29; 1969.* (4 references)

A number of materials being developed for insect control are as persistent or more persistent than materials like aldrin and heptachlor which have been banned because of their rather slow rate of degradation. In addition, the rates at which such new compounds must be applied are often greater than those used previously for the organochlorines. In laboratory studies, representative organochlorines and organophosphates have had little effect on soil microorganisms, but soil microorganisms have been shown to be important in the process of degradation of these chemicals. Although many pesticides have little impact on earthworm populations, chlordane, phorate, and carbaryl, which are commonly being substituted for banned organochlorines, have a toxic effect on these animals. Organochlorines have unfavorably altered arthropod populations and resistance to these chemicals has been observed. Although no resistance to the organophosphates has developed in Canada, it is expected that the use of more persistent members of this group will result in more rapid development of resistance. Absorption of residues by crops used for animal feed has been considered a problem while crops used for human consumption do not absorb hazardous levels of residues.

74-1028. Murray, W. S. (Working Group, Subcommittee on Pesticides, President's Cabinet Committee on the Environment, Washington, DC). **Economics and pesticides.** *Proc. Entomol. Soc. Ont. 100: 29-39; 1969.* (19 references)

Although pesticides are probably the most toxic environmental pollutants, pound for pound, they are not the most serious. Information is insufficient for determining to what degree they affect the environment, but there is an increased concern for effects of any of man's irreversible modifications and recognition of the need for assessment of the costs and benefits of all such activities to society. Material costs and benefits have always been evaluated for pesticides, but an evaluation of indirect costs and benefits is more difficult. There are various techniques by which dollar values can be given to such costs, though they may not satisfy all interested parties. It is also necessary to determine equitable distribution of cost between society, government, and manufacturer. The use of integrated control system, utilization of research teams competent in improving the efficiency of pesticide application, and reduction of single-crop acreages could minimize the impact of pesticides on the environment.

74-1029. Miller, J. (Woodrow Wilson Sch. Public and International Affairs, Princeton, NJ). **Israel: pollution problems rife, but other issues take priority.** *Science 176(4036): 781-784; 1972.*

Despite the existence of a strong and influential scientific community and antipollution legislation, Israel has been unable to cope with environmental pollution. The Israel National Committee on the Biosphere and Environment is studying the effects of environmental pollution in Israel, recommending suitable legislation and other action, and educating the public. The most serious ecological problem is water pollution, which results primarily from urban waste-water, industrial wastes, petroleum products, and the extensive use of chemical fertilizers, pesticides, and herbicides. Soil pollution, resulting from nitrification and herbicide utilization, is another pressing environmental concern, as are solid waste disposal, noise pollution, air pollution, food contamination, nature reserves, urban environmental quality, environmental aspects of arid zone research, and environmental education.

74-1030. Nakajima, H.; Chadani, K.; Ishikawa, M.; Hamamura, N.; Narafu, N.; Oniyanagi, S.; Nakajima, N.; Harada, Y. (Aichi Prefect. Inst. Pub. Health, Nagoya City, Aichi, Japan). **[On the residual concentration of BHC in waters of rivers, subterranean waters and rainwater in Aichi Prefecture.]** *Aichi-Ken Eisei Kenkyu-shoho (Rep. Aichi Prefect. Inst. Pub. Health) 23: 55-59; 1973.* (5 references) (Japanese)

The concentration of BHC isomers was determined in river water, subterranean water, and rain water. BHC in six rivers peaked in summer in 1971 and was very much reduced in Jan. or Feb. 1972. The α-, β-, γ-, and δ-isomer of BHC in water of Kiso river was 31/36, trace/52, 35/10, and n.d./trace in Feb./Aug. 1971 and 13, 32, 11 and 3 ppt in Jan. 1972. This reduction is probably due to the ban on BHC. The ratio of β-isomer (lindane) to total BHC in the summer of 1971 increased from the summer of 1970. The BHC content of internal organs of fish in the river showed a coefficient of 1700-2010, almost identical to that of the tap water from the river. Samples of water from 29 wells (subterranean) had an average of 40 ppt (2-182 ppt) in 1971, about half the value of BHC in 1970. The content of total BHC in rain water collected in Nagoya City in July 1971 was 900 ppt, the value being the same as the summer average in 1970. The ratio of each isomer to total BHC in rain water was high in α- and γ-, low in β. Only one well water sample had an abnormally high content of BHC at 39700 ppt and was caused by bad construction allowing the leakage of large amounts of soil. The water from other wells nearby showed a very small content of total BHC with 2-11 ppt.

74-1031. Baur, J. R.; Bovey, R. W.; McCall, H. G. (Agr. Res. Serv., USDA and Dept. Range Sci., Texas A & M Univ., College Station, TX 77843). **Thermal and ultraviolet loss of herbicides.** *Arch. Environ. Contam. Toxicol. 1(4): 289-302; 1973.* (29 references)

Exposure of free acids of picloram and 2,4,5-T to temperatures of 30° and 60° for 7 days resulted in 24% and 55% loss, respectively, at the higher temperature and no change at the lower temperature. Under the same conditions the free acid of dicamba was reduced 60% at 30° and 92% at 60°. Salts of picloram and 2,4,5-T were slightly more susceptible to thermal loss than the free acids, while the potassium salt of dicamba was more resistant than the free acid. A loss greater than that caused by temperature alone was observed on long-wave UV irradiation of free-acid and potassium salt of picloram and the potassium salt of 2,4,5-T. Ultraviolet degradation of free-acid picloram was shown to occur by a direct interaction of one photon of UV light with each molecule. Dicamba appeared to be less susceptible to UV degradation.

74-1032. Winterlin, W.; Walker, G.; Luce, A. (Environ. Toxicol. Dept., Univ. California, Davis, CA 95616). **Carbaryl residues in bees, honey, and bee bread following exposure to carbaryl via the food supply.** *Arch. Environ. Contam. Toxicol. 1(4): 362-374; 1973.* (9 references)

The LC50 obtained for carbaryl ranged from 3.8 to 4.5 ppm in three individual groups of bees. In short-term studies using 0.5 and 2.0 ppm carbaryl in the food, relatively high residues were detected in the bees at 2 hr by a new TLC technique and the mortality percentage was relatively low. If a delayed response were also observed in the field, a significant amount of carbaryl could be introduced in the colony before toxic effects became evident. Residues of carbaryl in honey of bees fed 2 ppm carbaryl ranged from 0.025–0.050 ppm and remained stable or increased over a period of 60 days. A maximum of between 0.05 and 0.10 ppm was found in the bee bread of carbaryl-fed bees within 35 to 42 days. There was a steady increase in pesticide accumulation in bees for several days, and then residues appeared to decline.

74-1033. Walker, W., II.; Mattox, W. G.; Risebrough, R. W. (Dept. Biol. Sci., Univ. Alaska, College, AK). **Pollutant and shell thickness determinations of peregrine eggs from West Greenland.** *Arctic 26(3): 256-257, 1973.* (1 reference)

Declining populations of peregrine falcons in various areas throughout Alaska and northern Canada have been characterized by thin eggshells. The degree of thinning was closely associated with the environmental levels of the DDT compound *p,p'*-DDE. In 1972 eggshells and shell fragments from peregrine populations in West Greenland were analyzed for evidence of shell thinning, and the levels of chlorinated hydrocarbons were determined in two unhatched eggs. The mean thickness of the shell samples was 14% less than the mean thickness of 42 peregrine eggs collected in Greenland before 1940; shell thinning in samples obtained from Ungava between 1967 and 1970 was more pronounced. The DDE concentrations in the unhatched eggs were similar to those in peregrine eggs from Alaska and northern Canada; the polychlorinated biphenyls (PCB) levels were comparable to those of DDE. Although the body burdens of organochlorine compounds in the West Greenland peregrines were not sufficiently high to affect reproductive success, a comparatively small increase in the DDE levels to which these birds are exposed would endanger the population.

74-1034. Khan, S. U. (Res. Sta., Agr. Can., Regina, Saskatchewan, Canada). **Equilibrium and kinetic studies of the adsorption of 2,4-D and picloram on humic acid.** *Can. J. Soil Sci. 53(4): 429-434; 1973.* (25 references)

Equilibrium and kinetic studies of the adsorption of 2,4-D and picloram on a humic acid have been made. The equilibrium data followed the Freundlich-type isotherm. Rate constants, activation energies, heats of

activation, and entropies of activation were calculated for the adsorption of the two herbicides on humic acid. The rate data indicated a physical type of adsorption. In the overall adsorption process the rate-limiting step for the initial period was shown to be the diffusion of the herbicide molecules to the surface of humic acid. However, the rate-limiting process at longer time intervals was interpreted to be intraparticle diffusion of the herbicide molecules into the interior of the humic acid particles. (Author abstract by permission)

74-1035. Peach, M. E.; Schaffner, J. P.; Stiles, D. A. (Dept. Chem., Acadia Univ., Wolfville, Nova Scotia, Canada). **Movement of aldrin and heptachlor residues in a sloping field of sandy loam texture.** *Can. J. Soil Sci. 53(4): 459-463; 1973.* (14 references)

The residues of aldrin, dieldrin, heptachlor, and heptachlor epoxide were investigated in Woodville sandy loam soils that had been used for tobacco farming. Movement of residues in a field demonstrates that concentrations of residues can be directly correlated with the topography of the land. The decrease is greatest at points of highest elevation and less at lower levels. The mode of transportation of pesticide through the soil is discussed. (Author abstract by permission)

74-1036. Wilson, D. M.; Oloffs, P. C. (Pestology Centre, Dept. Biol. Sci., Simon Fraser Univ., Burnaby 2, British Columbia, Canada). **Persistence and movement of α- and γ-chlordane in soils following treatment with high-purity chlordane (Velsicol HCS-3260).** *Can. J. Soil Sci. 53(4): 465-472; 1973.* (23 references)

Residues from high-purity chlordane (Velsicol HCS-3260) were determined in British Columbia soils for 16 mo following applications in June 1971 at two rates of 5.6 and 11.2 kg active ingredients (a.i.)/ha. Residues from a cool, moist location declined rapidly during the first month following application, with greater percentage loss from the lower application rate. From the second month until 16 mo after application decay rates were linear with time. Although 225 cm rain fell during this period, less than 2% of the total residues reached the 15-23 cm horizon. Calculated half-lives were 4 and 11 mo, respectively. Residues from a semiarid location were more persistent and did not decline rapidly within the first mo after application. Possible reasons for these differences are discussed. Leaching experiments with five different soil types in the laboratory confirmed the limited movement of chlordane observed in field soil. (Author abstract by permission)

74-1037. Krehm, H. S. (Dr. J. J. Fettes, Chem. Contr. Res. Inst., Forestry Service, Environ. Canada, 25 Pickering Pl., Ottawa, Canada K1A OW3). **Fenitrothion.** *Canada Forestry Service, Chemical Control Research Institute Information Rep. CC-X-39: 1-56; 1973.* (96 references)

Fenitrothion is similar in structure to parathion and methyl parathion and can be analyzed by the same methods. Metabolic studies in plants and animals have shown that fenitrooxon and aminofenitrooxon, when formed, occur in small amounts and are degraded or excreted rapidly. Measurable amounts of *p*-nitrocresol have been observed on some crops treated with fenitrothion. Drift of the compound during application is most affected by a strong temperature inversion and crosswind. Insufficient information is available for determining movement in water and soil, but a maximum soil half-life of 64 days has been obtained. ChE inhibition is the main effect of fenitrothion, and symptoms of toxicity appear at higher doses than for methyl parathion. In man, most of the dose administered is excreted in 24 hr and toxicity does not appear to be an occupational problem.

74-1038. Begum, S.; Gaeb, S.; Parlar, H.; Korte, F. (Tech. Univ. Muenchen, Inst. fuer oekol. Chemie, Munich, Germany). **Reaktionsverhalten von Kelevan in Loesung, als Festkoerper und in der Gasphase bei UV-Bestrahlung. [Reaction behavior of kelevan in solution, as a solid, and in gaseous phase under UV irradiation.]** *Chemosphere 2(6): 235-238; 1973.* (7 references) (German)

The reaction behavior and metabolism of kelevan in solution, as a solid, and in gaseous phase under UV irradiation were studied. When irradiated in *n*-hexane at wave lengths under 300 nm, kelevan yielded 9% of dechlorokelevan (metabolite II), 18% of 1,1a,3,3a,4,5,5-a,6-decachloro-octahydro-2-hydroxyl-2-methyl-1,3,4-methano-2H-cyclobuta(c,d)-pentalene (metabolite VI), and 30% of kepone (chlordecone) (metabolite VII). Kelevan yielded 8% of metabolite VI after irradiation for 1 hr in methanol. Two photoproducts with a yield of 15% were detected in both *n*-hexane and methanol. Both metabolites were probably formed through lactonization of the side chain. Following irradiation in acetone for 48 hr, kelevan formed some 15% of metabolite II. Following irradiation at a wavelength over 300 m, kelevan as a solid formed about 10% of metabolite VI and 35% of metabolite VII. Considerable acceleration of the photodegradation due to irradiation at wavelengths under 300 nm was observed. When irradiated in gaseous phase at wavelengths below 300 nm, kelevan formed mirex and kepone.

74-1039. Grosser, V.; Knoll, W. (Ernst-Moritz-Arndt-Universitaet Greifswald, Forschungsstelle fuer Medizinische Ernaehrungslehre an der Hautklinik, Greifswald, DDR). **Chlorierte Kohlenwasserstoffe im Blut des Menschen unter den Bedingungen der Nahrungskarenz. [Chlorinated hydrocarbons in the blood of humans under the conditions of food deprivation.]** *Deut. Gesundheitsw. 28(42): 1997-2000; 1973.* (12 references) (German)

The dynamism of the blood DDT levels under the conditions of food deprivation was studied in 21 overweight subjects who underwent zero diet (receiving calorie-free drinks only), apple juice diet, or buttermilk diet for 21 days. Mobilization of the DDT depots, and increases in the total DDT levels in the blood by 100% or more in the zero diet group were observed during fasting. At the end of the zero diet, no *p,p'*-DDT, *o,p'*-DDT and lindane were detected in the blood. The *p,p'*-DDT, *p,p'*-DDE, and lindane were chiefly responsible for the mobilization of the organochlorine hydrocarbon residues, while the observed increases in the *p,p'*-DDD levels were due to the metabolism of *p,p'*-DDT and *p,p'*-DDE. The total DDT level in the blood, though lowered, was still higher than the initial level four days after the 21-day slimming cure. Distinct movements of the DDT levels were also observed in the patients undergoing apple juice diet, while the DDT levels in the blood of the buttermilk patients showed only negligible changes. The possibility of the elimination of organochlorine residues from the body through fasting is discussed.

74-1040. Shimamoto, T.; Matsuda, H.; Ito, T.; Yano, K.; Okada, S. (Ehime Prefect. Hyg. Lab., Matsuyama City, Ehime, Japan). **[Results of determination of BHC residues in milk produced in Ehime Prefecture, Part 2.]** *Ehime-Kenritsu Eisei Kenkyusho-ho (Rep. Ehime Prefect. Hyg. Lab.) 33: 36-38; 1971.* (Japanese)

BHC was determined in commercial milk produced in dairies in Ehime Prefecture three times, in June and Sept. 1971 and March 1972. The α-, β-, γ-, δ-, and total BHC found in the three determinations averaged: 0.013, 0.083, 0.002, 0.002, and 0.099 (June 1971); 0.003, 0.022, 0.001, 0.002, and 0.028 (Sept. 1971); and 0.0008, 0.0033, trace, trace, and 0.0040 (March 1972). Values for April 1970 were 0.061, 0.143, 0.008, 0.018, and 0.230 ppm of whole milk showing the decrease. Dieldrin and *p,p'*-DDT were not found in the above mentioned three determinations. The method of determining BHC in milk followed the AOAC method.

74-1041. Shimamoto, T.; Matsuda, H.; Ito, T.; Miyake, H.; Shigemi, T. (Ehime Prefect. Hyg. Lab., Matsuyama City, Ehime, Japan). **[Results of pesticide residue determinations in vegetables and fruits produced in Ehime Prefecture, Part 1.]** *Ehime-Kenritsu Eisei Kenkyusho-ho (Rep. Ehime Prefect. Hyg. Lab.) 33: 39-42; 1971.* (Japanese)

Pesticide residues were determined in vegetables and fruits produced in Ehime Prefecture. Specimens analyzed in 1970 were: summer orange (pulp and peel), cucumber, tomato, tea, peach, grape, spinach, apple and cabbage. As_2O_3 was found on summer orange, 0.025 in pulp and 0.50 in peel, and on cucumber at 0.025 ppm. Dieldrin, endrin and parathion were not found in all samples. The kind and number of specimens analyzed in 1971 were nine pulps and four peels of summer orange, three of potato, three of strawberry, five of tomato, six of cucumber, three of tea, three of peach, two of Japanese pear, three of grapes and cabbage, one of rice grain and apple, three roots of Japanese radish, one top of Japanese cabbage, and three of spinach. As_2O_3 was found in the first six kinds at 0.02-0.130 ppm and lead was found in almost all the specimens at trace-0.300 ppm. α-, β- and γ-BHC were found from trace-0.076 ppm in all the specimens. Aldrin, dieldrin, endrin and parathion were not found in all crops. EPN was only detected in apple at 0.03 ppm.

74-1042. Matsuda, H.; Shimamoto, T.; Ito, T.; Ogida, K. (Ehime Prefect. Hyg., Lab. Matsuyama City, Ehime, Japan). **[On the analytical results of organochlorine pesticide residues in mothers' milk.]** *Ehime-Kenritsu Eisei Kenkyusho-ho (Rep. Ehime Prefect. Hyg. Lab.) 33: 43-48; 1971.* (3 references) (Japanese)

Human milk specimens, respectively collected (Nov. 1971) from five wives of farming homes and five wives of non-farming homes of Hojo (city) in Ehime Prefecture were analyzed by a method based on the AOAC method for α-, β-, γ-, δ- and total BHC, *p,p'*-DDT, *p,p'*-DDE, *p,p*-DDD (TDE), *o,p'*-DDT, total DDT, aldrin, dieldrin, endrin, heptachlor, and heptachlor epoxide. The average content (ppm in whole milk) of these pesticide and metabolite residues, respectively, in wives of farming homes and in those of non-farming homes were: trace-nd, 0.071, nd, nd, 0.071, 0.001, 0.003, nd, trace-nd, 0.003, nd, 0.002, nd, nd, and nd versus nd, 0.092, nd, nd, 0.092, tr-0.001, 0.003, nd, nd, 0.003, nd, 0.001, nd, nd, and nd. Total BHC was a little higher in milk of non-farming wives. The data shows a noticeable decrease of α-, β- and γ-BHC compared to data from December 1970 and persistence of β-BHC in the human body. From the frequency of detection, 4/5 and 2/5, and the content, dieldrin was a little higher in mothers' milk of farming homes. Compared to other prefectures, distribution of β-BHC, DDT, and dieldrin in Ehime is small. However, the calculated daily intakes of BHC and dieldrin in a baby are respectively 1.9-2.4 and 2.4-3.0 times the ADI of WHO.

74-1043. Miller, R. W.; Faust, S. D. (Dept. Soil Sci. Biometeorol., Utah State Univ., Logan, UT 84321). **Sorption from aqueous solution by organo-clays: II. Thermodynamics of 2,4-D sorption by various organo-clays.** *Environ. Lett. 2(4): 183-194; 1972.* (13 references)

Sorption isotherms obtained for 2,4-D on Wyoming bentonite clay with one cation exchange capacity of dodecylamine, or dimethylbenzyl octadecylammonium chloride (DMBODA) or dioctadecylammonium chloride indicated reduced sorption with increasing temperature, except at temperatures below 20° C. Tempkin plots fit the isotherms, although Langmuir plots also fit fairly well. Organo-clays prepared with an organic amine having both an aromatic

and long aliphatic component had 90% sorption of the 2,4-D, while those clays with only an aromatic or an aliphatic component usually had sorptions of less than 20% 2,4-D.

74-1044. Pramer, D.; Bartha, R. (Dept. Biochem. Microbiol., Rutgers Univ., New Brunswick, NJ 08903). **Preparation and processing of soil samples for biodegradation studies.** *Environ. Lett. 2(4): 217-224; 1972.* (18 references)

Precautions must be taken to ensure that changes caused by removal of soil from the field to the laboratory are minimized if biodegradation studies of pesticides and other chemicals are to be meaningful. A large number of samples should be obtained, screened, and maintained at moisture contents not less than 20% of the maximum holding capacity. The rate and pathway of degradation of pesticides by soil enzymes may be affected by air-drying samples. Storage should be for not more than 30 days in a thin-walled polyethylene bag at 15-20°. When water-soluble chemicals are studied, they should be dissolved in water and the soil added to the vessels containing the solution. The use of organic solvents is not recommended, but when it is necessary, small quantities should be used and the appropriate controls prepared.

74-1045. Mirna, A.; Hecht, H. (Bundesanstalt fuer Fleischforschung, Kulmbach, Germany). **Rueckstaende in Fleisch. Pestizide und Schwermetalle. [Residues in meat. Pesticides and heavy metals.]** *Fleischwirtschaft 53(9): 1211-1216; 1973.* (German)

Studies on pesticide and heavy metal residues in meat and meat products are reviewed. Organochlorine pesticides, such as DDT, accumulate in fatty tissues in considerable concentrations, while they usually have low levels in the musculature and organs. Although DDT can metabolize into DDD (TDE) and DDE in fatty tissues, its final metabolite in warm-blooded animals is DDA which is eliminated in the urine. Chlorinated phenols were determined to be the final metabolites of BHC in animals. Studies conducted in the USA revealed average organochlorine, carbamate, organophosphate, and chlorophenoxy residues of 0.02 mg, 0.05 mg, 0.003 mg, and 0.003 mg in foodstuffs in 1968. Roasting and broiling reduced the DDT, DDE, DDD, dicofol, and BHC residue levels in frying chicken by 10 to 60%. The breakdown of DDT in meat and meat products by microorganisms is being studied.

74-1046. Spynu, Ye. I.; Ivanova, L. N.; Bolotnyy, A. V. (All-Union Sci. Res. Inst. Hyg. Toxicol. Pesticides, Polymers, Plastic Materials, Kiev, USSR). **Zagryaźneniye okruzhayushchey sredy fosfororganicheskimi pestitsidami. [Environmental pollution by organophosphate pesticides.]** *Gig. Sanit. 38(10): 75-79; 1973.* (25 references) (Russian)

Persistence and pollution of air, water, and soil by organophosphate pesticides are reviewed. Air concentrations of 0.0001-25 $\mu g/m^3$ were measured during application of organophosphate pesticides. Methylmercaptophos and butyphos (DEF) were present in the air for 10 and 6 days after application, respectively. Dimethoate persisted in apples for 63 days and longer in apples following treatment. Trichlorfon was more persistent in apples than in tomatoes. Phencapton is more persistent in drier fruits than in juicy ones. Over 87% of malathion, dichlorvos, and mevinphos was decomposed in the soil during the first day after application. Methyl parathion and trichlorfon require 7 and 20 days to degrade to that extent. Parathion was highly persistent in the soil. Active migration of dimethoate especially in moist soil was observed. Thiophos accumulated in silt and in the aquatic flora and fauna.

74-1047. Kostovetskiy, Ya. I.; Tolstopyatova, G. V.; Chegrinets, G. Ya. (Kiev A. N. Marzeyev Sci. Res. Inst. General and Communal Hyg., Kiev, USSR). **O zagryaznenii otkrytykh vodoyemov pestitsidami, postupayushchimi s sel'skokhozyaystvennykh ob"ektov. [Pollution of open bodies of water by pesticides after agricultural application.]** *Gig. Sanit. 38(10): 99-100; 1973.* (2 references) (Russian)

Samples of soil, water, and benthic sediment from Ukrainian agricultural and horticultural areas with heavy pesticide use were analyzed for DDT, lindane, carbaryl, DNOC, methyl parathion, malathion, and trichlorfon residues, and the DDT and lindane residue dynamics in such samples were studied after pesticide application in an adjoining orchard. Among the 456 soil samples, 224 water samples, and 216 benthic residue samples analyzed, 21.3%, 7.1%, and 25% were contaminated by pesticides. Organochlorine pesticide residues were found in 92.9% of all contaminated soil samples and in 85.2% of all contaminated benthic residue samples. Seventy-five per cent of all water samples were contaminated by organophosphorus pesticides and 25% by organochlorine. A low DDT concentration was determined in lakeside soil samples two days after DDT treatment of an adjoining orchard. The DDT residue concentration in the soil samples increased by 5 to 10 times after a three-day rainfall, probably due to washout. DDT concentrations in the soil decreased in 2 months. The DDT application had no noteworthy effect on the DDT concentrations in the lake water due to rapid sedimentation. The highest lindane concentration in benthic sediments was measured 10 days after application and reached its lowest level after 3 months.

74-1048. Khasanov, Yu. U.; Davletov, E. N. (Uzbek Sci. Res. Inst. Sanit., Hyg., Occupat. Dis., Tashkent, USSR). **K gigiyenicheskoy otsenke vertoletnogo sposoba defoliatsii. [Hygienic appraisal of defoliant application by helicopter.]** *Gig. Sanit. 38(10): 103-104; 1973.* (Russian)

A hygienic appraisal of butyphos (DEF) defoliant application by helicopter, and study of the butyphos residue dynamics in the air, cotton plants, and soil were performed. A helicopter with pressurized cockpit and air filter should be used for butyphos application. The butyphos concentrations measured in air during loading and inside the cockpit during application were 0.1 mg/m^3 and 0.3 mg/m^3, respectively. The butyphos air concentration fell to below the maximum allowable value at 500 m from the treated cotton field, and no butyphos residues were detected in the soil and on cotton leaves at 200-300 m from the treated field. The butyphos residues in treated cotton leaves and in soil samples were 0.5 mg/kg and 0.1 mg/kg seven days after application. The butyphos concentration in the air over the treated cotton field fell to below the maximum allowable concentration in four days. Work on butyphos-treated cotton fields should not be performed earlier than 8 to 10 days after treatment.

74-1049. Vrochinskiy, K. K. (Author address not given). **Udaleniye pestitsidov iz vody pri raznykh metodakh vodopodgotovki. [Removal of pesticides from water by various water preparation methods.]** *Gig. Sanit. 38(11): 76-78; 1973.* (13 references) (Russian)

Studies on the efficiency of various water treatment methods in the removal of pesticide residues from water are reviewed. Chlorine, peroxides, and aeration slightly degraded lindane, DDT, dieldrin, endrin, and 2,4,5-T. Both ozone and potassium permanganate broke down lindane, but only ozone broke down dieldrin. Potassium permanganate and aeration could be used for aldrin. Ozone was useful for 2,4-dichlorophenylacetaté, and 2,4-D derived compounds were resistant to potassium permanganate and chlorine. Conversion of parathion into paraoxon by chlorination was determined. Chlorination and ozonization were suitable for removing dimethoate from water. Adsorption on activated carbon was effective for removing lindane, BHC, toxaphene, endrin, parathion, dimethoate, 2,4,5-T esters, 2,4-D esters, and simazine from water. Conventional water treatment methods, such as coagulation, settling, filtration, and chlorination did not reduce pesticide residue contents in water except for DDT. Chlorination, ozonization, or treatment with potassium permanganate can result in the formation of more toxic intermediary products, as with parathion-paraoxon, or in the deterioration of the organoleptic properties of the water, as with BHC, methyl parathion, and malathion.

74-1050. Egan, H. (Lab. Government Chemist, London, England). **Trace contaminants in milk and dairy products.** *J. Soc. Dairy Technol. 23(4): 177-184; 1970.* (39 references)

Some of the controversial aspects of trace contaminants in milk and dairy products, particularly as they apply to the British situation, have been reviewed. Organochlorine pesticide residues are of special interest because they are stored in the milk fat and generally undergo little degradation during processing of dairy products. In Britain, however, levels of BHC, dieldrin, and DDT have been declining as a result of voluntary restriction of the use of such pesticides and residues are well below FAO/WHO acceptable daily intake levels. Organophosphate residues have not been found in British milk despite their use on a large scale in agriculture. When recommendations of dose and withdrawal time are followed, there does not seem to be a problem with antibiotics, but as indicated in a discussion of the review, these are entirely under the control of the farmer, and marker dyes should be developed to discourage their misuse. Trace metals are not considered to be an immediate problem.

74-1051. Bovey, R. W.; Burnett, E.; Richardson, C.; Merkle, M. G.; Baur, J. R.; Knisel, W. G. (U.S. Dept. Agr., Agr. Res. Serv., College Station, TX). **Occurrence of 2,4,5-T and picloram in surface runoff water in the Blacklands of Texas.** *J. Environ. Qual. 3(1): 61-64; 1974.* (12 references)

This investigation was conducted to determine the concentration of 2,4,5-T and picloram in surface runoff water that may move from herbicide sprayed pastures and rangeland to untreated areas as a result of each major rainfall following treatment. A 1:1 mixture of the triethylamine salts of 2,4,5-T + picloram was sprayed 5 times at 1.12 kg/ha every 6 months on a native-grass pasture watershed. Soil, grasses, and runoff water were analyzed periodically following herbicide treatment. Hérbicide content in the Houston Black clay from May 1970 to May 1972 remained low (0 to 238 ppb). Herbicide content on grass was high (50 to 70 ppm) immediately after treatment, but degraded rapidly thereafter. Plant "washoff" was the main source of herbicide detected in runoff water. Concentration of herbicide was moderately high (400 to 800 ppb) if heavy rainfall occurred immediately after treatment, but low (<5 ppb) if major storms occurred 1 month or longer after treatment. No damage occurred to cotton (*Gossypium hirsutum* L.) or sorghum (*Sorghum bicolor* (L.) Moench) from either spray drift or subsequent runoff water in fields adjacent and below several herbicide-treated watersheds. (Author abstract by permission)

74-1052. Iwasaki, F.; Kaise, R.; Saito, Y.; Date, M.; Iida, K.; Watanabe, S.; Wada, H.; Takashashi, Y.; Fuchigami, S.; Nagano, H.; Kuroi, N.; Yasukata, S. (Kanagawa Prefect. Res. Lab. of Pub. Health, Yokohama City, Kanagawa, Japan). **[Results of pesticide residue analyses of vegetables, milk.]** *Kanagawa-Ken Eisei Kenkyusho Nenpo (Annu. Rep. Kanagawa Prefect. Pub. Health Lab.) 22: 99-101; 1972.* (Japanese)

Pesticide residues were determined in specimens of milk and vegetables produced in Kanagawa Prefecture.

Total BHC, β-BHC, total DDT, and dieldrin values in raw milk for June and Nov. 1972 and Jan. and March 1973 averaged 0.027 ppm, 0.024, 0.007, and ND; 0.007, 0.004, 0.002, and 0.001; 0.007, 0.005, 0.004, and 0.001; and 0.007, 0.005, 0.003, and ND. Those in commercial milk were 0.019, 0.011, 0.004 and ND; 0.008, 0.005, 0.004, and 0.002; 0.008, 0.005, 0.003, and 0.001; 0.008, 0.006, 0.002 ppm, and ND. The values were less than the temporary tolerance of the Ministry of Health and Welfare, and had not changed since the previous year. The values in 64 vegetable specimens of 24 kinds showed no residues of DDT, parathion, dieldrin, endrin, EPN, malathion, and diazinon. Total BHC was detected at 0.002-0.015 ppm with a detection percentage of 30.2, probably due to the soil residue of BHC. Carbaryl was detected in unpolished rice (0.012-0.008 ppm) with detection rate of 2/3, satsuma orange (0.03 ppm) at 4/4, tea (0.034 ppm) at 1/1, potato (0.007 ppm) at 1/1, spinach (0.019-0.021 ppm) at 2/2, and apple (0.007) at 1/1. In general, the values became smaller when restriction of pesticide use was not carried out severely.

74-1053. Yoshiike, A. (Section of Soil and Pesticides for Agriculture, the Environment Agency of the Japanese Government, Tokyo, Japan). **[Diagnosis of environment seen from soil-pollution. The present state of soil pollution by heavy metals and pesticides.]** *Kankyo Sozo (Environ. Creation) 4(1): 84-89; 1974.* (Japanese)

The present state of soil pollution in Japan is outlined. Soil pollution by pesticides used for agricultural uses is attributed to persistent, not-easily decomposed organochlorine insecticides. These pollute the field soil, are absorbed by the crops and in turn pollute the agricultural produce. Instances of crop-pollution through polluted soil are potatoes and cucumbers produced in eight prefectures and containing aldrin, dieldrin, and/or endrin more than the standard value in 1970. Countermeasures for soil pollution by pesticides include the regulation of pesticides with severe restrictions on the use of aldrin and dieldrin and prohibition of the use of BHC and DDT. Pesticides applying for registration will be held back if they are persistent and pollute the soil. Fields polluted by persistent pesticides are not recommended for planting of vegetable crops such as cucumber and Japanese radish, but can be used for growing ornamental plants.

74-1054. Wada, T.; Takanuma, S. (Nagano Prefect. Agr. Exp. Sta., Nagano City, Nagano, Japan). **[Relation between the organochlorine pesticide residues in major fruits and those in soil in Nagano Prefecture.]** *Kanto Tosan Byogaichu Kenkyukai Nenpo (Proc. Kanto Tosan Plant Protect. Soc.) 20: 172-173; 1973.* (Japanese)

From figures on the amount of pesticides applied in Nagano Prefecture and the natural conditions it is estimated that residues of DDT are highest in the apple growing district. The authors determined organochlorine pesticide residues in 18 apples (trees and their fruits), three grapes, one pear, and in the soil in which the trees were grown. In apples and soil contents of total-, α-, β-, γ- and δ-BHC, total DDT, *p,p'*-DDT, *o,p'*-DDT and *p,p'*-DDE averaged 0.0056, 0.0035, 0.0006, 0.0012, 0.0005, 0.017, 0.008, 0.003, and 0.006 ppm (raw fruit) and 1.06, 0.110, 0.818, 0.080, 0.048, 35.3, 23.8, 5.83, and 5.72 ppm (air dried soil). Residues of *p,p'*-DDT, *o,p'*-DDT and *p,p'*-DDE in peel and pulp of an apple to which DDT had been applied two times were 2.62, 0.318, and 0.042 (peel), and 0.002, not detected, and 0.008 ppm (pulp). Total BHC and total DDT residues in the roots and bark of trunk, sub-trunk, and twigs of an apple tree were respectively 0.057, 0.019, 0.034, and 0.036 and 6.41, 1.43, 4.65, and 0.187. In the wood values were respectively 0.007, 0.005, 0.010, and 0.011 and 0.215, 0.032, 0.036, and 0.009 ppm. BHC contents in fruit and soil and those of total-DDT were not correlated; *p,p'*-DDT and *o,p'*-DDT were correlated. Since BHC and DDT remained in the upper layer of apple orchard soil, crops planted after the orchard had been converted to vegetable fields probably contained more BHC and DDT than usual.

74-1055. Kuribayashi, S. (Central Branch, Sericultural Exp. Sta., Min. Agr. and Forestry, Matsumoto City, Nagano, Japan). **[On the adhesion and residue of insecticides applied to mulberry trees.]** *Kanto Tosan Byogaichu Kenkyukai Nenpo (Proc. Kanto Tosan Plant Protect. Soc.) 20: 174-175; 1973.* (Japanese)

Ten widely applied insecticide formulations including trichlorfon, dichlorvos, phorate, malathion, fenitrothion, fenthion, carbaryl, propoxur, EPN, and mecarbam were diluted with water and sprayed on both sides of mulberry tree leaves, enough to drip. The amount of adhered insecticide and its fate were determined by extraction and dilution. A bioassay was run using newly hatched larvae of silkworm. The adhered amount of each active ingredient was, in the above order, 61.2, 49.8, 63.0, 59.5, 62.4, 64.1, 73.1, 71.2, 51.6, and 27.9 ppm, the uniformity of adherence being confirmed by autoradiogram with ^{32}P-labeled malathion. The residual amount decreased exponentially with time, but the rate of disappearance differed among insecticides. The residual amounts after 20 days of application were 0.02, not detected, 0.05, 0.2, 0.08, 0.05, 0.4, 0.5, 1.1 and < 0.05 ppm. Three days were required for dichlorvos and 30 for EPN to lose toxicity to the silkworm, the former being least persistent and the latter being the most persistent insecticide among the insecticides tested.

74-1056. Hyde, K. M.; Graves, J. B.; Fowler, J. F.; Bonner, F. L.; Impson, J. W.; Newsom, J. D.; Haygood, J. (Dept. Entomol., Louisiana State Univ., Baton Rouge, LA). **Accumulation of mirex in food chains.** *La. Agr. 17(1): 10-11; 1973.*

Animals and plants obtained from an area which had received six aerial applications of mirex bait at a rate of 1.25 lbs./A. over a four year period were analyzed for residues of the pesticide. Aquatic plants did not contain detectable amounts of mirex, but snails, crawfish, and fish had residues from 0.01 to 0.75 ppm and softshell turtle fat contained 24.82 ppm. Birds sampled had levels from 0.12 to 1.91 ppm. The fat of terrestrial animals at the top of the food chain contained up to 73.94 ppm. Mirex levels in a number of species commonly used for food were above established tolerances.

74-1057. Rieder, W.; Schwertmann, U. (Technische Univ. Munich, Inst. fuer Bodenkunde, 805 Freising-Weihenstephan, Germany). **Kupferanreicherung in hopfengenutzten Boeden der Hellertau. [Copper accumulation in soils used for hop growing in Bavaria.]** *Landwirt. Forsch. 25(2): 170-177; 1972.* (11 references) (German)

The accumulation of copper was studied in fields in which hops were grown for 5 to 43 years and sprayed with copper-containing fungicides. Top soil of eight soil profiles with 7-16% clay contained more than 500 ppm total Cu after up to 43 years, against initial Cu levels of 10-20 ppm. The annual accumulation averaged 12.1 ppm Cu which compares fairly well with the calculated amount of approximately 12 ppm. Practically no copper reached the groundwater. Ninety per cent of the Cu accumulated was soluble in 0.05 *M* EDTA or 0.43 *N* HNO_3, both commonly used for the extraction of plant available Cu. Exchangeable Cu increased from less than 1 ppm to up to 7 ppm Cu. The relationship between pCu (exchangeable) and pH was linear between pH 4.5-6.5 with a slope pCu/pH of approximately 0.5, indicating a reaction between one Cu^{2+} and two H^{+}. Liming the soil above pH 6.5 did not seem to reduce the exchangeable Cu significantly. The native total Cu was highly correlated with clay ($r = 0.975$) and total iron ($r = 0.985$). A Neubauer experiment with summer wheat indicated no detrimental effect of a high Cu content in the soil, but compared to a normal soil, the uptake of Fe and particularly of Mn by the plant was significantly reduced.

74-1058. Williams, R.; Holden, A. V. (Inst. for Marine Environ. Res., Oceanographic Lab., Edinburgh, Scotland). **Organochlorine residues from plankton.** *Mar. Pollut. Bull. 4(7): 109-111; 1973.* (6 references)

Organochlorine pesticide and polychlorinated biphenyl (PCB) residues were measured in zooplankton (herbivores and first stage predators) from Gouroch in the Firth of Clyde to International Ocean Weather Station India, 400 miles west of Scotland. There was a marked gradation in the concentrations of dieldrin, total DDT, and PCB from the Clyde to the open waters of the eastern Atlantic, dieldrin decreasing by a factor of about 50, total DDT by a factor of 9, and PCB by a factor of 12. The residue values found in the sample containing juvenile fish, zooplankton predators, zooplankton herbivores, and phytoplankton confirm the assumption that there is a progressive concentration of these residues moving up the marine food chains.

74-1059. Siyali, D. S. (Div. of Analytical Labs., Lidcombe, N.S.W., Australia). **Polychlorinated biphenyls, hexachlorobenzene and other organochlorine pesticides in human milk.** *Med. J. Aust. 2(17): 815-818; 1973.* (17 references)

Forty-five specimens of human milk were collected from patients in four metropolitan hospitals in Sydney, Australia. Various pesticides were extracted from the samples and separated and identified by gas-liquid chromatography. DDT, dieldrin, and hexachlorobenzene (HCB) were found in 100% of the samples in mean concentrations of 64, 5, and 15.6 ppb, respectively; BHC and heptachlor epoxide were also found in small quantities in 27% of the samples. None of the samples contained polychlorinated biphenyls. In general, these results are comparable to those obtained in similar studies throughout the world, although Germany, France, and the Netherlands are the only other countries which have reported the presence of BHC in human milk samples. It is unlikely that the occurrence of BHC is confined to these countries, indicating that great caution should be exercised in drawing conclusions from any data based on human tissue sample analyses.

74-1060. Siyali, D. S.; Stricker, P. (Div. Analytical Labs., Health Comm. N.S.W., Lidcombe, Australia). **Erroneous blood pesticide levels due to sample containers with PCBs.** *Med. J. Aust. 2(17): 832-833; 1973.* (1 reference)

Blood can be a good indicator of pesticide exposure if it is collected in an all-glass container with lithium heparin as the preservative. When the sample is collected in a plastic container or a glass tube with a plastic stopper, contaminants including polychlorinated biphenyls (PCBs) are leached from the plastics. These contaminants give rise to extraneous and confusing peaks in gas-liquid chromatography. With the method used for the rapid screening of pesticides, PCBs cannot be separated from DDT and can falsely indicate high blood levels of DDT. It is also important that the samples be delivered to the laboratory for analysis within 24 hours since some pesticides break down during prolonged storage.

74-1061. Anonymous. **International monitoring of food contamination.** *Med. J. Aust. 2(18): 840; 1973.*

The World Health Organization presented a proposal to the Third FAO/WHO Conference on Food Additives and Contaminants for an international monitoring system of food contamination. Contamination

may be environmental or industrial in origin, result from the use of chemicals in agriculture and food processing, or occur naturally in the food. A pilot project has already been initiated which involves the computerized calculations of potential intakes of food additives and pesticide residues. The program would significantly improve the safety of foods and promote world trade in foods.

74-1062. Siyali, D. S.; Ouw, K. H. (Div. Anal. Lab., Div. Occup. Health Pollut. Contr., Lidcombe, N.S.W. 2141, Australia). **Chlorinated hydrocarbon pesticides in human blood—Wee Waa survey.** *Med. J. Aust. 2(19): 908-909; 1973.* (1 reference)

The populations of Wee Waa and Narrabri, cotton-producing areas in which large quantities of pesticides were used, had residue levels considered acceptable and in the same range as those in a similar population of Sydney. Occupationally exposed persons had an average of 21.9 ppb DDT and 57.1 ppb hexachlorobenzene in the blood. Respective values for non-exposed persons were 16.7 and 59.9 ppb. Dieldrin, heptachlor epoxide, lindane, or BHC was not detected in either group.

74-1063. Glofke, E. (Vienna, Austria). **Pestizide in Milch und Milchprodukten. [Pesticides in milk and milk products.]** *Milchwirt. Ber. Bundesanst. Wolfpassing Rotholz 34: 37-40; 1973.* (German)

Organochlorine pesticide residues in milk and milk products were analyzed in Austria. After DDT was used for fly control in a cowshed, DDT residues fell from 0.08 ppm to 0.01 ppm in three months. Forage samples analyzed contained BHC (12%), DDT and its metabolites (71%), lindane (98%), aldrin (24%), dieldrin (63%), heptachlor (1%), and PCNB (21%). Milk samples investigated contained 0.001-0.01 ppm of BHC, 0.001-0.1 ppm of DDT and its metabolites, and 0.001 ppm of lindane, dieldrin, and PCNB. The percentages of the samples contaminated with BHC, DDT, lindane, dieldrin, and PCNB were 25%, 48%, 65%, 45%, and 13%. All butter samples analyzed contained 0.01 to 0.1 ppm of DDT (including DDE and TDE), lindane, and dieldrin. All sour cream and milk powder samples contained 0.001-0.01 ppm of these pesticides. Cheese samples contained 0.01-0.1 ppm of DDT, 0.001-0.01 ppm of lindane, and dieldrin. The percentage of cheese samples contaminated with DDT, lindane, and dieldrin was 62%, 100%, and 75%, respectively. Although the pesticide residue levels determined are not particularly high, organochlorine pesticides should be replaced by less persistent organophosphates in livestock farming.

74-1064. Yamaguchi, S.; Matsumoto, H.; Matsuo, S.; Kaku, S.; Tateishi, M.; Shiramizu, M.; Mori, Y.; Kuwabara, Y.; Ide, I. (Sch. of Pub. Health, Fac. of Med., Kurume Univ.. Kurume City, Fukuoka, Japan). **[An epidemiological study of pollution by organochlorine pesticides.]** *Minzoku Eisei (Hum. Hyg.) 38(6): 309; 1972.* (Japanese)

Pesticide residues in the blood of men and women working in a pesticide formulating factory were studied from July 1971 to July 1972. The factory had manufacturing histories of about 2400 tons of BHC formulations, but no history of DDT manufacture. Blood was collected from individuals and the residues determined. The content of β-BHC and *p,p'*-DDT showed almost no change during one year, but that of *p,p'*-DDE significantly increased. This suggests that the intake of DDT or its metabolites continued via foods. The content of β-BHC was significantly higher in men's blood than in women's in 1971, but not in 1972. The content of DDE and DDT showed a smaller difference between sexes in 1972 than in 1971. This tendency may be due to the improvement in eating habits. (Presented at XXXVII Annu. Meeting of Japan. Soc. Race Hyg., Nov. 20-21, 1971, Yamaguchi City).

74-1065. Pfeilsticker, K. (Rheinische Friedrich-Wilhelms-Universitaet, Lehrstuhl fuer Lebensmittelwissenschaft, Bonn, Germany). **Pestizide in der Kindererernaehrung. [Pesticides in baby food.]** *Monatsschr. Kinderheilk. 121(8): 551-553; 1973.* (7 references) (German)

General problems of the contamination of baby foods with pesticide residues are discussed, and pesticide residue determinations in food are reviewed. Human milk repeatedly contained residues of DDE, DDT, lindane, β-BHC, and PCB, mobilized from the fat during the lactation period. Fat samples from babies 6-7 months old contained 0.94-1.44 mg of total DDT per kg of body weight and 0.26-0.32 mg of β-BHC per kg. Total DDT and β-BHC levels of 4.51 mg/kg and 0.57 mg/kg, respectively, were found in the fat of a baby 7 days old. Fat samples from 13 fetuses contained an average of 7.2 ppm total DDT. The DDT, DDE, β-BHC, BHC, and PCB residue levels in human milk samples averaged 0.031, 0.081, 0.018, 0.153, and 0.103 mg/kg. The corresponding values for human fat were 1.10, 2.10, 0.45, 6.3, and 5.7 mg/kg, respectively. Investigations of 34 cow's milk samples revealed an average BHC residue level of 0.263 ppm. The average BHC residue levels in butter and cheese were determined as 0.596 mg/kg and 0.01 mg/kg. Milk powder contains reduced residue levels due to volatilization during processing. Vegetables and especially cereal products including apples, pears, strawberries, carrots, lettuce, and tomato were contaminated mostly with lindane (22% of all samples investigated), DDT (21%), parathion (17%), endosulfan (8%), and herbicides. Of a total of 4,619 samples, 68.8% contained no pesticide residues, and only 3.4% of the samples contained residues exceeding the maximum allowable levels.

74-1066. Lyre, H. (Biol. Bundesanstalt fuer Land- und Forstwirtschaft, Lab. fuer botanische Mittelpruefung,

Braunschweig, Germany). **Quecksilber in Pflanzenschutzmitteln und ihr Einfluss auf Gewaesser. [Mercury in pesticides and its influence on water bodies.]** *Nachrichtenbl. Deut. Pflanzenschutzdienstes 25(11): 170-171; 1973.* (6 references) (German)

The hazards involved in the use of organomercurial pesticides as seed dressings in West Germany are discussed. The use of seeds dressed with organomercurial fungicides results in the introduction of 3 to 4 g of mercury per ha yearly; rainwater contains 0.2-0.3 mg of mercury per liter. The background mercury content in the upper 20 cm-layer of the soil ranges from 50 to 500 g/ha. Consequently, the yearly mercury supply in the form of dressed seeds equals the amount of mercury present in 500 mm rainwater. The use of organomercurial fungicides does not entail groundwater contamination hazards. A complete ban on mercurial seed dressing agents is unjustified.

74-1067. Trenkmann, L.; Koch, C. (Pflanzenschutzamt beim Rat fuer landwirtschaftliche Produktion und Nahrungsgueterwirtschaft des Bezirkes Leipzig, Leipzig, DDR). **Erfahrungen aus der Zusammenarbeit zwischen Bezirks-Pflanzenschutzamt und Bezirks-Hygiene-Institut Leipzig zur lebensmittel-hygienischen Ueberwachung der Pflanzenproduktion. [Experiences with the cooperation between District Plant Protection Bureau and District Hygiene Institute Leipzig concerning hygiene inspections of plant products.]** *Nachrichtenbl. Pflanzenschutzdienst DDR 27(10): 202-203; 1973.* (4 references) (German)

The Leipzig County Institute of Hygiene and the Leipzig County Plant Protection Bureau have a commendable division of labor and co-operate in the hygienic inspection of plant products for pesticide residues. Some results of residue analyses in produce are given. Sampling and analysis are performed on the basis of annual plans worked out by the National Plant Protection Service, while analysis is done by the County Institute of Hygiene. Among a total of 48 samples investigated in 1971, 40% did not contain residues of the pesticides with which they had been treated, while the residue levels in another 10.7% slightly exceeded the maximum allowable values (0.4 ppm demephion in cabbage, and 1.0 ppm of dimethoate in apple). Among the 52 samples investigated in 1972, 57.7% of the samples did not contain pesticide residues, another 38.5% were contaminated, and 3.8% contained residues in excess of the allowable concentrations.

74-1068. Reifenstein, H.; Czyrnia, W.; Beitz, H. (Biol. Landesanstalt Berlin der Akad. der Landwirtschaftswiss. der DDR, Inst. fuer Pflanzenschutzforschung Kleinmachnow, Kleinmachnow, DDR). **Zum Rueckstandsverhalten der Praeparate Trizilin, Trakephon und bercema-CCC im Boden. [On the residue dynamics of the products trizilin, trakephon and bercema-CCC in the soil.]** *Nachrichtenbl. Pflanzenschutzdienst DDR 27(10): 204-207; 1973.* (5 references) (German)

The residue dynamics of 2,4-dichloro-4′nitrodiphenyl ether (active agent of trizilin), 1-butylaminocyclohexane phosphonic acid dibutyl ester (active agent of trakephon), and of chlormequat chloride (bercema-CCC) in loess, sandy, and compost soils were studied in model experiments. Diphenyl ether proved to be highly persistent over several months in all types of soils tested. An initial concentration of 4-5 ppm fell to 2.8-3.6 ppm in 107 days. Trakephon had a half-life of 8 to 11 days. No residues of chlormequat were detected in loess soils 28 days after introduction. Only slight penetration was found for diphenyl ether and trakephon. Although chlormequat is highly water-soluble, it is not considered to be a potential groundwater contaminant on account of its rapid decomposition.

74-1069. Lohs, P.; Luckas, B.; Strege, G.; Wetzel, H. (Hygiene-Institut des Bezirkes Rostock, Rostock, DDR). **Erfahrungen aus der Praxis. Zur Persistenz von Wolfen-Thiuram 85 auf gruenem Salat. [Practical experiences. The persistence of Wolfen-Thiuram 85 on lettuce.]** *Nachrichtenbl. Pflanzenschutzdienst DDR 27(10): 212-213; 1973.* (4 references) (German)

The dynamics of TMTD (thiram) residues were studied on lettuce leaves after dusting or spraying. One, 2, 4, 7, 11, 14, 21, 28, and 35 days after application of 10 g TMTD dust per m^2, TMTD residues of 2, 125, 1,650, 1,200, 850, 320, 240, 50, 4, and 2 ppm were found on young lettuce leaves. Repeated dusting 40 days after the first application at an expenditure of 7 g TMTD per m^2 resulted in TMTD residues of 600, 200, and 30 ppm on the 7th, 14th, and 21st days, respectively. The TMTD residues found 1, 4, 7, 14, 21, 28, and 35 days after spraying with 4 g TMTD per m^2 were 450, 288, 115, 30, 30, 8, and 5 ppm. The corresponding values obtained for spraying at an expenditure of 1.6 g TMTD per m^2 were 375, 225, 110, 72, 16, 8, 1, 0.3, and less than 0.3 ppm. The results indicate negligible effect of rainfall on the TMTD residues on lettuce leaves. Lettuce should be sprayed at an expenditure not higher than 1.5 g/m^2. If dusting is applied, it should be performed immediately after planting. The waiting time until harvesting should be increased from the 3 days currently used to 21 days to ensure that the TMTD residue level does not exceed the maximum allowable concentration of 3 ppm.

74-1070. Zoro, J. A.; Hunter, J. M.; Eglinton, G.; Ware, G. C. (Organic Geochem. Unit, Sch. Chem., Univ. Bristol, Great Britain). **Degradation of *p,p′*-DDT in reducing environments.** *Nature (London) 247(5438): 235-237; 1974.* (23 references)

The environmental degradation of *p,p′*-DDT was studied in sewage sludge, baker's yeast, iron salts and iron porphyrins, bacterial cultures, and annelid worms.

Secondary sewage sludge converted DDT to DDD (TDE) under aerobic conditions with a half-life of 3 hr; the DDD was stable. Sterilization with gamma-radiation did not disrupt the degradation and, while inactivation by aeration or autoclaving did, activity was instantly restored following lowering of the *Eh* with sodium dithionite. No significant degradation took place in fresh yeast solutions unless the *Eh* was lowered with sodium dithionite; autoclaving enhanced the degradation. Increasing the ferrous ion concentration in the sewage sludge did not significantly increase the degradation process nor did the addition of ethanol. The conversion of DDT to DDD was increased significantly by an Fe(II) porphyrin at biological pH. Rapid degradation was also obtained when ferrous sulfate was substituted for sodium dithionite. The addition of hematin and detergent to anaerobic sewage sludge greatly increased the conversion of DDT to DDD. The conversion to DDT appears to be effected in any situation in which DDT and reduced iron porphyrins are brought together in solution. Since most living material contains iron porphyrins which should be released on decay, high DDD/DDT ratios should be found in the tissues of animals scavenging on dead and decomposing organisms.

74-1071. Suzuki, M.; Yamato, Y. (Kita-Kyushu Municipal Institute of Hygiene, Kita-Kyushu, Japan). **[Organochlorine pesticide residues in soil of Kita-Kyushu district.]** *Nippon Koshu Eisei Zasshi (Jap. J. Pub. Health) 20(10S): 404; 1973.* (Japanese)

Soil samples collected from an upland field with an unknown history of pesticide application were extracted with acetonitrile after the addition of water, and the extract partitioned with *n*-hexane and water. The hexane-layer was analyzed with ECD-gas chromatography. The range and mean value of α-, β-, γ-, δ-BHC, aldrin, dieldrin, endrin, *p,p'*-DDE, *p,p'*-DDD (TDE), *p,p'*-DDT, and *o,p'*-DDT in 99 samples were: 7.605-0.002 and 0.226; 2.806-0.021 and 0.563; 1.785-0.003 and 0.106; 1.530-0.001 and 0.099; 1.012-0.002 and 0.070; 1.720-0.002 and 0.200; 0.629-0.016 and 0.183; 2.058-0.008 and 0.173; 1.544-0.018 and 0.324; 9.801-0.015 and 1.147; 1.745-0.007 and 0.416 ppm on dry matter bases. Cyclodiene pesticide residues were fairly high. Monitoring of soil and produce in this district will be necessary.

74-1072. Kamata, T. (Sch. of Hygiene, Fac. of Med., Hiroshima Univ., Hiroshima, Japan). **[On the present status of environmental pollution by organochlorine pesticide residues.]** *Nippon Koshu Eisei Zasshi (Jap. J. Pub. Health) 20(10S): 405; 1973.* (Japanese)

Agricultural crops, edible seaweed, shellfish, human milk, cow's milk, and cattle feed from an area highly polluted by BHC were analyzed for β-, γ- and total BHC, *p,p'*-DDE, *p,p'*-DDT, and total DDT. The contents of these pesticide residues in the above order were as follows: in lettuce 0.003, 0.002, 0.005, N.D., N.D., and < 0.001; in cabbage 0.001, 0.004, 0.005, N.D., N.D., and < 0.001; in tomato 0.001, 0.004, 0.005, N.D.; N.D., and < 0.001; in cucumber 0.004, 0.003, 0.009, N.D., N.D., and < 0.001; in eggplant N.D., 0.004, 0.005, N.D., N.D., and < 0.001; in pimiento N.D., 0.004, 0.005, N.D., N.D., and < 0.001, in an edible seaweed (Nori) 0.003, 0.044, 0.049, 0.003, 0.003, and 0.038; in short-necked clam 0.003, 0.007, 0.017, 0.003, 0.032, and 0.035 (wet basis) ppm. In human milk the residues were, respectively, 0.093-0.191, 0.007-0.010, 0.200-0.102, 0.032-0.058, 0.009-0.017, and 0.038-0.075; in cow's milk, they were 0.003-0.028, 0.005-0.009, 0.013-0.043, 0.002-0.010, N.D.-0.006, and 0.002-0.016. In rice straw for cattle feed values were, respectively, 0.013, 0.034, 0.060, N.D., N.D., and < 0.001 ppm. From these findings it can be seen that the residues in vegetables have diminished to the ppb level. Those in cow's milk were 0.1 of those three years ago; however, BHC in human milk was the same. Sea fishes were so polluted by PCB that the determination of BHC was impossible.

74-1073. Ito, K.; Umemura, N. (Chita Health Center, Aichi Prefect., Chita, Japan). **[Environmental pollution and preservation of health of mothers and their children—on the pollution by organochlorine pesticides.]** *Nippon Koshu Eisei Zasshi (Jap. J. Pub. Health) 20(10S): 406; 1973.* (Japanese)

Total DDT, β-BHC, dieldrin, and PCB were determined in blood and milk of mothers, blood of umbilical cord, and blood of the babies three months and one year after birth. Babies were given only mother's milk (Group A), half mother's milk (Group B), 1/5 mother's milk (Group C), or commercial milk only (Group D). Three months later the concentration of organochlorine residues in blood was significantly different between babies in Groups A and D although the concentration of PCBs was not. One year after birth a difference in concentration of organochlorine pesticide residues could not be found. Conclusions of tests were: mother's milk contained an amount of organochlorine pesticide residues several times larger than the blood; organochlorine pesticide residues translocated to fetus from mother via the placenta; a three month old baby fed mother's milk has greater residues than a baby fed commercial milk; the concentration of pesticide residues in mother's milk is greatest during lactation and shows the need for proper nutritional care and diet during pregnancy and lactation.

74-1074. Takao, S.; Ogawa, A.; Osaki, M.; Nakagawa, R.; Matsueda, T.; Morimoto, M. (Fukuoka Prefect. Inst. of Hygiene, Fukuoka, Japan). **[A study of pesticide residues in water.]** *Nippon Koshu Eisei Zasshi 20(10S): 408; 1973.* (Japanese)

Pesticide residues, mainly BHC, were determined in three rivers which are the source of water for a city

and several wells in Fukuoka Prefecture. Some information was obtained on the seasonal fluctuation of the pesticides in the waters. The average values of total BHC were 0.73 (40 samples), 0.89 (18), and 0.13 (8) ppb in the three rivers, from Jan. 1971 to Oct. 1972, June 1971 to Dec. 1972, and Nov. 1971 to Aug. 1972, respectively. The percentage of BHC (α-, β-, γ- and δ-BHC) in the above mentioned rivers was 19-57, 0-80, 0-58, and 0-18; 11-53, 23-69, 10-67, and 0-41; and 0-100, 0-63, 0-64, and 0-26%, respectively, as contrasted to 0-76, 0-85, 0-100, and 0-40 in well water. Generally, the BHC content was higher in rivers in field regions and lower in mountainous regions, and higher during pesticide application season. However, the highest value was less than 5 ppb. Although BHC has been banned since Dec. 1971, a detectable amount larger than usual was found in the pesticide application season. In well water BHC was not detected at more than 1 ppb.

74-1075. Fujiwara, K.; Koike, K.; Sugiyama, T.; Miyaji, M. (Inst. of Putrefaction Research, Chiba Univ., Chiba, Japan). **[A study for the method of testing biodegradability of environment-polluting substances.]** *Nippon Koshu Eisei Zasshi (Jap. J. Pub. Health) (10S): 441; 1973.* (Japanese)

Experiments on carbaryl degradation were performed in an artificial model river, using activated sludge obtained from a sewage treatment station and natural river mud. Degradation of carbaryl by activated sewage sludge was investigated using the Warburg method with shaking. In the Warburg test, the oxygen consumption amounted to 7% of the theoretical value after 70 hr with 1 mg of carbaryl and 0.3% by volume of active sludge. Degradation amounted to 18% after 6 days of shaking. Water was recycled in the artificial river. About one third of the added carbaryl had disappeared after two days, about two thirds after four days, and carbaryl was no longer detectable after eight days in the river. The initial carbaryl concentration was 4 ppm in river water and 5 ppm in the shaker.

74-1076. Takase, I.; Nakamura, H. (Agr. Chem. Inst., Nihon Tokushu Noyaku Seizo Co., Ltd., Hino City, Tokyo, Japan). **[The fate of ethylthiometon in paddy soil.]** *Nippon Nogei Kagaku Kaishi (J. Agr. Chem. Soc. Jap.) 48(1): 27-34; 1974.* (18 references) (Japanese)

When ethylthiometon was incubated in paddy soil under flooded conditions at 25-30°C at a rate of 6 ppm based on dried soil, it was rapidly oxidized to ethylthiometon sulfoxide. Further oxidation to the sulfone was slight. After 7-10 days of incubation the previously oxidized sulfoxide was gradually reduced to form the parent insecticide, ethylthiometon. The formation of the oxygen analog amounted to less than 5% of the ethylthiometon added initially. This reductive reaction occurred in volcanic ash soil and also in alluvial soil, but only under flooded conditions. When ethylthiometon sulfoxide was incubated in flooded soil, the reduced product, ethylthiometon, was detected in increasing amounts with the lapse of time; however, this phenomenon was not observed when ethylthiometon sulfone was incubated. After addition of glucose to the soil, oxidation and reduction reactions occurred, but the insecticide was more likely to be hydrolyzed. The degradation of ethylthiometon was suppressed in sterilized soil as compared to unsterilized soil, but the sulfoxide was reduced to form ethylthiometon. The half life of ethylthiometon, including its five oxidative metabolites with insecticidal efficacy, appeared to be about 50 days in flooded paddy soil and 30-40 days in upland soil.

74-1077. Yamamoto, K. (Lab. of Pesticide Residues, Nat. Inst. Agr. Sci. Technol. Min. Agr. and Forestry, Tokyo, Japan). **[Pesticidal polychlorocyclodiene residues in soil and selection of vegetables which are to be grown in the soil.]** *Nogyo Gijutsu (J. Agr. Sci.) 28(12): 542-545; 1973.* (4 references) (Japanese)

Aldrin dust containing 3.8% active ingredient was applied at 1-10 kg/10 are (generally 3-6 kg) for several years to paddy fields where vegetables were grown under vinyl greenhouses during the rice off-season. The resulting residues were 1.7-0.05, 0.6-0.05, 0.6-0.03, 0.2-0.03, 0.1-0.05, 0.05, and 0 ppm respectively in soils in which application had been stopped 1, 2, 3, 4, 5, 6, and 7 years before in Kochi Prefecture, Shikoku Region. More detailed investigations revealed that the half-life of aldrin in the field was greater than one year in 16% of the cases, one year in 54%, and less than one year in 29% of the cases. Statistical studies of residues in cucumber fruits vs. residues in soil gave an upper translocation limit of 30%, with 95% confidence. The aldrin residues in common vegetables decrease in the following order (in five classes): (carrot, potato, cucumber) > (radish, sweet potato, melon) > (spinach) > (cabbage, lettuce, soybean) > (eggplant, tomato, pimiento, kidney bean). Thus eggplant, tomato, or kidney bean could be planted in soils in which relatively high levels of aldrin remain.

74-1078. Geisman, J. R. (Dept. Horticulture, Ohio Agricultural Res. Development Cent.). **Effects of disposal of tomato wastes on soil.** *Ohio. Agr. Res. Develop. Cent. Res. Summ. 65: 27-28; 1973.* (1 reference)

Five million gallons of effluent from a tomato processing plant were spread fairly uniformly over a 40-acre block of clay loam farmland in northwestern Ohio. Analysis of soil samples for possible herbicide carryover indicated that no herbicides were present in the waste effluent. Poor growth of tomato plants the season after waste disposal was attributed to the high sodium content of the wastes.

74-1079. Bhuiya, Z. H.; Rothwell, D. F. (Dept. Soil Sci., Bangladesh Agr. Univ., Mymensingh, Bangladesh).

Conversion of DDT to DDD in flooded soil. *Plant Soil 39(1): 193-196; 1973.* (8 references)

Soil samples representing Arredondo fine sand were air dried, sieved, and mixed with technical DDT to concentrations of 10, 110, or 210 ppm. Some samples were then moistened and maintained under aerobic conditions, while others were flooded with distilled water and maintained under anaerobic conditions; all samples were stored in an incubator at 37°C for 12 weeks. The *p,p'*-DDT was dechlorinated to *p,p'*-DDD (TDE) in the flooded soil, where water-logged conditions created or favored anaerobiosis. In the samples containing 10 ppm DDT, the *p,p'*-DDT decreased from 8.83 ppm to 6.45 ppm, while *p,p'*-DDD increased from 0.05 to 2.25 ppm. In the samples containing 110 ppm DDT, the concentration of *p,p'*-DDT decreased from 62.44 to 26.89 ppm, and the concentration of *p,p'*-DDD increased from 3.6 to 11.68 ppm. In the samples containing 210 ppm DDT, the *p,p'*-DDT concentration decreased from 104.78 ppm to 80.21 ppm, while the *p,p'*-DDD concentration increased from 5.25 to 27.18 ppm. The *o,p'*-DDT concentration decreased from 4.75 to 2.82 ppm in the samples containing 10 ppm DDT, from 22.15 to 8.88 ppm in the samples containing 110 ppm DDT, and from 46.29 to 25.12 ppm in the samples containing 210 ppm DDT. Similar amounts of *p,p'*-DDE were found in all samples regardless of DDT concentration or amount of moisture.

74-1080. Harris, C. R.; Sans, W. W. (Res. Inst., Canada Dept. Agr., London, Ontario, Canada). **Vertical distribution of residues of organochlorine insecticides in soils collected from six farms in southwestern Ontario.** *Proc. Entomol. Soc. Ontario 100: 156-165; 1969.* (17 references)

Soil samples taken from six farms in southwestern Ontario contained 5-8 of the 11 organochlorine pesticides for which they were analyzed. Vertical distribution was dependent on soil type, cultivation, and characteristics of the chemical. In uncultivated soils *o,p'*-DDT, *p,p'*-DDT, *p,p'*-DDE, *p,p'*-DDD (TDE), and dicofol were generally held in the top six inches of soil, while fairly uniform distribution in the top 10 inches was observed in cultivated soils. Up to 14% of the organochlorine residue was found in the 10 to 12-inch layer of cultivated light mineral soils, indicating that some leaching took place below the plough depth. Aldrin, a rather volatile insecticide, was found in smaller amounts in the 0- to 2-inch layer than in lower layers, while dieldrin residues were slightly higher in the top 2 inches.

74-1081. Spaulding, J. E. (U.S.D.A., Anim. Plant Health Inspect. Serv., Meat Poultry Inspect. Prog., Washington, DC 20250). **Pesticide and heavy metal residues.** *Proc. Meat Ind. Res. Conf. 11-23; 1972.* (4 references)

Results of recent national residue surveys of the Meat and Poultry Inspection Program show that there was little change in organochlorine levels in animals between 1967 and 1971, although levels in poultry declined. Accidental feed contamination and use of a single feed ingredient containing a higher than usual residue were responsible for most of the violative residues. In a heavy metal study begun in 1970, arsenic was found in only 6.6% of the livers, < 1% of the kidneys, and none of the muscle tissue, and the maximum level was 0.22 ppm. Less than 8% of poultry surveyed had detectable polychlorinated biphenyl (PCB) residues, and 95% of birds having residues had levels below 5 ppm. Only 1% of the animals surveyed had PCB residues, and these were below 3 ppm.

74-1082. Billing, K. J.; Phelps, R. J. (Dept. Zool., Univ. Rhodesia, P.O. Box MP 167, Salisbury, Rhodesia). **Records of chlorinated hydrocarbon pesticide levels from animals in Rhodesia.** *Proc. Trans. Rhodesia Sci. Ass. 55(1): 6-9; 1972.* (3 references)

A widespread occurrence of DDT, DDE, TDE, and dieldrin in undomesticated animals was observed in a Rhodesian survey, and highest values were found in areas where agricultural land use was best developed. Levels in crocodile eggs were comparatively low, total DDT ranging from 0.95 to 1.75 ppm. However, this indicated that low levels were present even in remote lakes and concentrated in the food chain. Residues in herbivores were low, but since no predators of these species were samples, it was impossible to determine degree of concentration at higher trophic levels.

74-1083. Greve, P. A. (Lab. Toxicol., Nat. Inst. Pub. Health, Utrecht, The Netherlands). **Potentially hazardous substances in surface waters.** *Sci. Total Environ. 1(2): 173-180; 1972.* (7 references)

Results of monitoring toxic substances in the Rhine River are given for the period, September 1969–March 1972. Heptachlor, heptachlor epoxide, aldrin, dieldrin, endrin, and DDT-complex were found but in low concentrations. Another organochlorine pesticide, endosulfan, was found sporadically during 1969 and 1970, but rarely since July, 1970. α-Benzenehexachloride (α-BHC), γ-BHC (lindane), and hexachlorobenzene (HCB) have been found consistently in the Rhine in concentrations about ten times that of typical agricultural surface waters. Cholinesterase inhibiting compounds are common in the Rhine River and its tributaries. Polychlorinated biphenyls (PCBs) have not been found in detectable amounts (<0.5 μg/liter). Experimental details on the methods of analysis are discussed.

74-1084. Scherer, E. E. (Del Monte Corp., San Francisco, CA 94119). **No residue requirements.** *Sciences 14(1): 3; 1974.*

A Letter-to-the-Editor refutes the claim that Del

Monte Corporation refused to accept fruit from growers with too low a level of insecticide residues and explains company policy. The corporation does reject crops containing pesticide residues above government standards and insists that chemicals used by growers be specifically approved for use by federal and state regulations. The use of integrated controls or non-chemical controls is encouraged. The editor reported that the claim was made by the Food Action Campaign which obtained the information from two California farmers under contract to Del Monte Corporation.

74-1085. Woodcock, D. (Dept. Agr. and Hort., Univ. of Bristol Res. Sta., Bristol. England). **Metabolism of fungicides and nematocides in soils.** *Soil Biochem. 2: 337-360; 1971.* (135 references)

In recent years the use of soil and seed treatment fungicides and nematocides has increased tremendously. The importance of these procedures for disease control underlines the need for improving current knowledge concerning the fate of chemicals applied to the soil. Aside from the physical factors involved, greater understanding must be gained of the soil microflora, which consist of bacteria, actinomycetes, and fungi. The effects of these microflora, particularly the fungi, on the various soil chemicals are reviewed. Consideration is given the following classes of chemicals: aliphatic compounds, quinones, organomercurials, dithiocarbamates, captan, phenols, halogenonitrohydrocarbons, sodium-*p*-dimethylaminobenzene sulfonate (Dexon), and the antibiotics.

74-1086. Domsch, K. H. (Inst. Soil Biol., Res. Cent. Agr., Braunschweig-Voelkenrode, Germany). **Interactions of soil microbes and pesticides.** *Symp. Biol. Hung. 11: 337-347; 1972.* (23 references)

Recent findings concerning the effects of pesticides on soil microbes and degradation of these chemicals by microorganisms are discussed in relation to their bearing on soil fertility. Microbial oxidation of glucose, pectin, and chitin (substrates requiring uniformly distributed enzyme systems) was not seriously affected by 500 ppm captan, but no oxidation of cellulose, xylan, or cutin occurred. A delayed utilization of these substrates was observed with lower concentrations of captan. The importance of temporary inhibitions caused by pesticides should not be exaggerated since microbial populations often fluctuate because of unfavorable environmental conditions. Oxidation, reduction, ester hydrolysis, dealkylation, dehalogenation, and ring hydroxylation and ring cleavage of pesticides have all been demonstrated with soil microorganisms, but there is a wide gap between pure-culture work and elucidation of urgent problems occurring in the soil environment. The adaptation of the micropopulation, growth conditions and requirements not met in the soil, availability of pesticide to microbes, lack of tolerance or lack of enzyme induction in microbes, and physical and chemical changes in the soil will have to be studied more closely.

74-1087. Nikolova, G.; Bakalivanov, D. (Plant Protection Inst., Kostinbrod Station, Bulgaria). **Microbiological activity and breakdown of Casoran herbicide in the soil.** *Symp. Biol. Hung. 11: 385-389; 1972.* (6 references)

Field application of Casoron granulated material at 7.5 mg/ha substantially decreased ammonifying bacteria, particularly in the 0-4 cm layer of soil, 60 to 90 days after treatment, but did not affect nitrogen-fixing bacteria of the *Azotobacter* genus. The effect on ammonifying bacteria was observed in model studies but disappeared more quickly, probably because optimal temperature and moisture promoted more rapid formation of toxic degradation products. Actinomycetes were affected in the same way as bacteria, but to a lesser degree; stimulation was observed in the 4-8 cm layer 30 days after application. The growth of fungi was also inhibited. Although decomposition was observed, some herbicide residue was found in the soil 150 days after treatment.

74-1088. Zakharian, S. V. (Res. Inst. Microbiol. Armenian Acad. Sci., Erevan, USSR). **Relationship between dalapon and trichloroacetic acid herbicides and the microflora of light brown soils.** *Symp. Biol. Hung. 11: 391-395; 1972.*

Dalapon and sodium trichloroacetate degraded in the laboratory more rapidly in non-sterile than in sterile soil. In field studies dalapon degraded completely after 3.5 months and STCA after 3 months in the presence of growing plants. Almost all groups of soil microflora were inhibited by dalapon during the 60 days following application, but increased growth of microorganisms was observed after this time. The growth of nitrifying, ammonifying, and cellulose-decomposing microrganisms was not markedly inhibited by dalapon. A stimulation of almost all groups of microorganisms studied was observed in the first 10 days after mixing STCA in the soil.

74-1089. Rodriguez, E. B.; Worsham, A. D. (Market Dev., Monsanto Venezuela C.A., Apartado Postal 6477, Caracas 101, Venezuela). **Herbicides for flue-cured tobacco. II. Soil persistence.** *Tob. Sci. 17: 170-174; 1973.* (19 references)

Bioassays of soil from tobacco fields treated with R-7465, benefin, isopropalin, or pebulate showed R-7465 to be the most persistent with 80, 48, and 42% of 1.0, 2.0, and 4.0 lb/A applied remaining after 20 weeks. When incorporation was pre-bed with the disk as compared to post-bed incorporation with a power-driven rotary hoe, a greater concentration of all herbicides was found in the 3- to 6-in. soil layer than in the 0- to 3- in.

depth. Dissipation of benefin and isopropalin did not vary significantly with method of incorporation, but disk-incorporated pebulate disappeared more slowly at the 3- to 6-in. depth. Oats and wheat planted after tobacco harvest were not injured in the benefin, isopropalin, or pebulate-treated plots, but were almostly completely killed by residues in plots treated at 4 lb/A R-7465.

74-1090. Mestres, R.; Illes, S. (Lab. de Chimie appliquee a l'expertise, Fac. Pharm. Montpellier, Montpellier, France). **Mise en evidence d'un nouveau polluant de l'environnement. Un exemple d'accumulation de polychlorotriphenyles par la faune aviare. [Detection of a new environmental pollutant. Example of accumulation of polychlorinated terphenyls in birds.]** *Trav. Soc. Pharm. Montpellier 33(2): 201-208; 1973.* (4 references) (French)

Polychlorinated terphenyls and organochlorine pesticide residues were detected in a gull egg from the Rhone delta by two-stage gas chromatographic technique. The gulls egg contained 0.15 mg of lindane, 3.8 mg of DDE, 5.7 mg of DDT, 0.8 mg of PCB, and 23 mg of polychlorinated terphenyls per kg. DDT, DDE, PCBs, and polychlorinated terphenyls affected avian reproductive success.

See also **74-1014** **74-1015** **74-1022** **74-1025** **74-1102** **74-1103** **74-1105** **74-1130** **74-1134** **74-1152** **74-1169** **74-1172** **74-1231**

74-1091. Alexander, L. B. (Author address not given). **Legislation, pollination and pesticides, the beekeepers' viewpoint.** *Amer. Bee J. 113(10): 368, 394; 1973.*

Insecticides highly toxic to honey bees have replaced DDT in Oregon. Most of the damage occurs as the result of applying the products to blooming honey producing plants. However, outlawing pesticides is not an answer. Compensating beekeepers for poisoned hives as is provided for in the Bee Loss Indemnification Act is not a good solution either. Pollination by bees is a fundamental process in cultivated and wild plants. The Oregon State Beekeepers Association has therefore urged the Oregon State Legislature to recognize the need for extended research on pollinating insects. The beekeepers also favor the implementation of restrictions on pesticides known to be deadly to pollinators.

74-1092. Menz, M.; Leutkemeier, H.; Sachsse, K.* (Res. Dept., Pharm. Div., Ciba-Geigy, Ltd., Werk Stein, Basel, Switzerland). **Long-term exposure of factory workers.** *Arch. Environ. Health 28(2): 72-76; 1974.* (12 references)

In the course of the production and processing of a dichlorvos (DDVP)-releasing product, a number of male and female factory workers were exposed to an average DDVP concentration of approximately 0.7 mg/m^3 of air. They were observed carefully to detect any adverse effect at the earliest moment. Extensive laboratory tests carried out on these persons in the course of a one-year period of exposure showed moderate to slight inhibition of the cholinesterase (ChE and AChE) only. The results of other tests and of thorough medical examinations conducted at regular intervals were entirely normal. It was concluded that the inhibition of the cholinesterase did not correspond with any untoward effect and that no hazard to the health of the personnel existed. (Author abstract by permission)

74-1093. Wagner, S. L.; Weswig, P. (Environ. Health Sci. Cent., Weniger Hall, Oregon State Univ., Corvallis, OR 97331). **Arsenic in blood and urine of forest workers.** *Arch. Environ. Health 28(2): 77-79; 1974.* (7 references)

Five healthy forest workers exposed to cacodylic acid during a two-month period were observed for evidence of accumulation of arsenic in the blood, the pattern of its urinary excretion, and signs of clinical toxicity. Urinary arsenic appeared to constitute an index of exposure, with excretion levels increasing within one week. Blood levels were found to correlate poorly with exposure. Worker education and proper safety precautions in clothing must be emphasized. Arsine gas in treated forest areas may be potentially dangerous to forest workers. (Author abstract by permission)

74-1094. Shakman, R. A. (Environ. Health Consultation Serv., Ojai, CA 93023). **Nutritional influences on the toxicity of environmental pollutants.** *Arch. Environ. Health 28(2): 105-113; 1974.* (75 references)

Nutritional factors influence the toxicity of some environmental pollutants. Pollutants of importance in such interactions are some pesticides, a number of minerals, and oxidant air pollutants. Nutritional factors of importance in these interactions are dietary protein, especially sulfur-containing amino acids, trace minerals, and vitamins A, C, D, and E. Agricultural and geographical factors and food processing procedures affect the interactions. Pathophysiological mechanisms seem to exist that suggest that common air pollutants and pesticides may act in a combined or synergetic fashion to pose an even greater threat to human health than has been recognized. (Author abstract by permission)

74-1095. Mayersdorf, A.; Israeli, R. (Dept. Neurol., "Soroka" Med. Cent. in the Negev, PO Box 151, Beer-Sheva, Israel). **Toxic effects of chlorinated hydrocarbon insecticides.** *Arch. Environ. Health 28(3): 159-163, 1974.* (14 references)

Electroencephalograms were obtained from a sample of 73 workmen who were continually exposed to chlorinated hydrocarbon insecticides (CHCI). Abnormal records were obtained in 16 cases (21.9%). The most severe changes were noted in the group exposed to CHCI for one to two groups with either shorter or longer exposure periods. The abnormal EEG patterns varied. Some of the records showed bitemporal sharp waves with shifting lateralization and, with low voltage, diffuse theta activity. Paroxysmal discharges composed of slow and sharp waves, most pronounced anteriorly, spike-wave complexes, and posteriorly located low-voltage rhythmic spikes were demonstrated in other records. None of those examined showed either abnormal neurological features or clinical convulsions. This study suggests high exposure of the workmen studied; however, it is not clear enough whether closure of the whole chemical plant or removal of persons from the high risk areas for long periods of time is warranted. (Author abstract by permission)

74-1096. L'Epee, P.; Texier, L.; Lazarini, H. J.; Ducombs, G.; Doignon, J.; Larcebau, S.; Miegeville, M. J. (Universite de Bordeaux II, Institute de medicine du travail, Bordeaux, France). **L'arsenicisme cutane d'evolution tardive. Les cancers arsenicaux. [Late-developing cutaneous arsenicalism. Arsenical cancers.]** *Arch. Mal. Prof. Med. Trav. Secur. Soc. 34(7-8): 457-461; 1973.* (French)

Late-developing cutaneous cancers have occurred in the Bordeaux area due to the use of arsenical pesticides in vineyards. Hyperkeratosis, dyskeratosis (Bowen's disease), and hyperchromia were the major dermatologic symptoms of arsenicalism. Basocellular and especially spinocellular epitheliomas may develop after a latency period of 14 yr. The frequency of epithelio-

matosis in vineyard workers was 58%; the average duration of exposure to arsenical insecticides was 6 yr. The average age of the epithelioma patients was 45 yr, with extrema of 15 and 67 yr. Pulmonary and hepatic neoplasms were observed. Benign and malignant lesions may be present simultaneously in the same patient.

74-1097. Larrard, J. de (Author address not given). **Accident therapeutique a l'atropine apres intoxication supposee aux organo-phosphores. [Therapeutic accident with atropine following presumed organophosphate poisoning.]** *Arch. Mal. Prof. Med. Trav. Secur. Soc. 34(7-8): 470; 1973.* (French)

Accidental acute poisoning with some organophosphate pesticide during application in a greenhouse was followed by a therapeutic accident involving oral administration of atropine. Visual troubles, hypacusis, and vertigo were determined seven months after poisoning. The sequelae are due to atropinization rather than to the unidentified organophosphate pesticide proper.

74-1098. Prost, G.; Vial, R.; Tolot, F. (Author address not given). **Intoxication par le dinitro-orthocresol avec atteinte hepatique. [Poisoning by dinitro-orthocresol with hepatic involvement.]** *Arch. Mal. Prof. Med. Trav. Secur. Soc. 34(9): 556-557; 1973.* (French)

A case of acute dinitro-*ortho*-cresol (DNOC) poisoning occurred in a 30-year-old male who failed to wear protective devices and clothing while spraying fruit trees. Hyperthermia, excessive perspiration, headache, vertigo, asthenia, moderate jaundice with considerable cytolysis and hypocholesterolemia, and pronounced hypergammaglobulinemia with gradual recovery were diagnosed. DNOC, entering the body through the skin or via the respiratory tract, is slowly metabolized by reduction of the 6-nitro group and excreted in the urine. Following administration of DNOC at 75 mg/kg per day for 5 consecutive days to human volunteers, DNOC was detectable in the blood for 40 days. Hyperthermia, perspiration, neurologic disorders with agitation, headache, vertigo, convulsions, possible hepatic and renal involvement, and, in serious cases, anoxia, cyanosis, coma, and death from cardiac arrest or acute pulmonary edema are results of DNOC poisoning. Accelerated metabolism with increased oxygen consumption, adenosine triphosphate insufficiency, reduced anabolism, and accumulation of fat in the liver were observed.

74-1099. Armstrong, J. F.; Wolfe, H. R.; Comer, S. W.; Staiff, D. C. (Wenatchee Res. Station, Primate and Pesticides Effects Lab., Environmental Protection Agency, Wenatchee, WA). **Oral exposure of workers to parathion through contamination of food items.** *Bull. Environ. Contam. Toxicol. 10(6): 321-327; 1973.* (4 references)

Six volunteers worked for 1 hour or 5 hours hand thinning apples in orchards which had been sprayed 24 to 48 hours earlier with a 0.03% parathion solution using a wettable powder formulation. Each worker then handled sandwiches, pickles, cookies, and candy bars, ate half of each item, and left the remainder for examination. Candy bars were also exposed to various field conditions while carried in the pockets of workers. The results indicate that a person working a normal 5-hour forenoon of thinning in an orchard sprayed 24 hours earlier would potentially ingest an average of 0.155 mg of parathion when eating a lunch consisting of 6 half-sandwiches, 3 cookies, and 2 pickles. Similarly, the results of the candy bar experiments indicated that the potential exposure occurring as a result of eating candy with parathion-contaminated hands is not particularly high under conditions of normal exposure. However, much larger amounts of pesticide could be ingested eating a candy bar after the handling of more concentrated pesticide formulations (e.g., a 45.6% emulsifiable concentrate formulation). The data indicates that spraymen applying parathion should refrain from carrying food items during pesticide application operations and should pay particular attention to protecting themselves (especially hands) from exposure to the more concentrated formulations during mixing and spray tank loading activities. Washing hands before eating is also advisable for any worker who comes into contact with pesticides.

74-1100. Senanayake, N.; De Silva, W. A. S.; Salgada, M. S. L. (Dept. Med., Fac. Med., Peradeniya, Ceylon). **Arsenical polyneuropathy—a clinical study.** *Ceylon Med. J. 17(4): 195-203; 1972.* (18 references)

Although the incidence of arsenic poisoning is decreasing in most parts of the western world, it is still quite prevalent in many developing countries, probably because of the ready availability of arsenicals used in agriculture. Raw vegetables and fruits grown in areas treated by arsenic herbicides may be a source of ingested arsenic. Diagnosis of poisoning can be aided by analysis of urine, hair, and nail clippings. Symptoms most frequently encountered are gastroenteritis and mental confusion. Dimercaprol administered late in the course of the disease does not appear to affect the course of neuropathy.

74-1101. Shah, M. S.; Kantawala, D.; Dave, R. M. (Environmental Engineering Consultants, Bombay 40001, India). **Treatment and disposal of wastewaters from CIBA pesticides plant.** *Chem. Age (India) 24(2): 101-106; 1973.* (7 references)

The effluent treatment system designed for the CIBA pesticides plant in Corlim Goa is comprised of a collection pit with a holding time of 15 min., two equalization tanks with acid lining having a holding time of 24 hr each (which should permit hydrolysis of any accidental pesticide discharge), two settling tanks having a holding time of 24 hr which allow for complete

degradation by hydrolysis of pesticide discharge, and a diffuser outfall located on the bed of the Cumbarjua Channel. The treated effluent is routinely monitored for various parameters. Space has been provided for expansion of the plant if expansion is required.

74-1102. Anonymous. **Les tolerances en residus de pesticide. [Tolerances for pesticide residues.]** *Chim. Actual. 1516: 23; 1973.* (French)

Problems connected with the use of different types of pesticides in France, pesticide residues and the recently adopted pesticide residue act, and actual residue analyses in fruits and vegetables are discussed. The pesticides used in France in 1972 were formulated from a total of 62 active agents, of which 17 were insecticides, 12 fungicides, and 32 herbicides. Eleven insecticides, accounting for 5.5% of the total volume of pesticides used, are classified as toxic; 16 active agents, accounting for 19.5% of the total volume are rated as dangerous; the rest, or 75% are harmless. Investigations in France of some 1,000 fruit and vegetable samples have shown that pesticide residues were not detectable in 91% of all samples, residues were within the maximum allowable concentrations in 8%, and residues exceeded the maximum allowable level in 11%.

74-1103. Newberne, P. M. (Massachusetts Inst. Technol., Cambridge, MA). **Mercury in fish: a literature review.** *Crit. Rev. Food Technol. 4(3): 311-335; 1974.* (89 references)

A review of available data concerning the hazards of consuming mercury-contaminated fish shows that acute poisoning in man is an everpresent potential hazard where mercury compounds are used. In Japan, industrial contamination of waters with mercury and subsequent conversion to methyl mercury by aquatic organisms led to widespread poisoning. In Iraq and Mexico consumption of mercury-treated grains intended for seed also resulted in poisoning. In the U.S. mercury fungicides for seeds may no longer be used, but even with more public awareness and strict surveillance, acute mercury poisoning remains a possibility. The FDA guideline of an upper limit of 0.5 ppm mercury in fish to be used for human consumption has been questioned, particularly by the fishing industry. The possibility of methylmercury poisoning from fish in the U.S. is limited to a small number of consumers with higher than average fish consumption, and it is expected that educational programs would be the best approach to protecting this segment of the population.

74-1104. Sekubanga, J. G. (Makerere Univ. Med. School, P.O. Box 7072, Kampala, Uganda). **The pulmonary surfactant.** *East Afr. Med. J. 50(1): 27-32; 1973.* (45 references)

Paraquat poisoning is one condition in which pulmonary surfactant, which protects the lung from collapse during expiration, may be deficient. About 10 cases of paraquat poisoning in man have been reported, and all victims appear to have died from respiratory failure. Thickening of the alveolar walls by fibroblastic cells and deposition of collagen were observed in the lungs of these patients and also in lungs of experimentally poisoned animals. Reduction in lung lipids, which constitute the surfactant, has been observed in some but not all animals given paraquat.

74-1105. Anonymous. **[Fourteen kinds of foods and four kinds of pesticides have been included in the Pesticide Residue Standards System in Japan.]** *Fainkemikaru (Fine Chemicals) 3(1,2); 38-39; 1974.* (Japanese)

The Japanese Ministry of Health and Welfare amended part of the pesticide residue standard (tolerance) to add 14 foods and four pesticides. The newly established standards for dichlorvos are 0.1 ppm on/in Japanese pear, root of Japanese radish, fruit of eggplant and pimiento. Dimethoate is 1.0 ppm on/in peel and pulp of summer orange, potato, persimmon, and pimiento. The cidial standards (phenthoate in Japan) are 0.1 ppm on/in satsuma orange and European pear. That of captan on/in cucumber is 5.0 ppm. The standard for parathion on/in the newly added vegetables and fruits, *Brassica rapa*, Garland chrysanthemum, sweet melon, *Cucumis melo* var. Makuwa, sweet cherry, cauliflower, parsley, asparagus, celery, melon, European pear, *Allium fitulosum*, onion, and carrot is 0.3 ppm. The standards for BHC and DDT on/in most of the above are 0.2 ppm. The standards for dieldrin and aldrin on/in the above crops are N.D. The standard for diazinon on/in the newly appointed crops is 0.1 ppm except for celery, *Allium* spp., and carrot. Carbaryl residue is standardized at 3.0 ppm on European pear. The dicofol residue standard on/in sweet cherry is 3.0 ppm, and the chlorobenzilate residue standard is 2.0 ppm. Other standards for pesticide residues on other crops will be added in the future.

74-1106. Uchida, T. (School of Ophthalmol., Fac. of Med., Kyoto Univ., Kyoto, Japan). **[A case of retinochoroid pathosis due to chronic intoxication by organophosphorus pesticides.]** *Ganka Rinsho Iho (Jap. Rev. Clin. Ophthalmol.) 68(2): 191-192; 1974.* (Japanese)

A 47-year-old nonfarming man who frequently used organophosphate insecticides, especially malathion, and failed to wear protective equipment developed bilateral optic neuritis. Retinal and choroid degeneration were also present, resulting in slightly impaired vision, narrowing of the visual field, and hemeralopia. Although the patient had glycosuria and neural syphilis, the fundus findings comprised irreversible pathological signs such as diffuse, dirty-looking retinal opacities and cystoid degeneration of the macula lutea area, which are

quite different from the abnormalities produced by the systemic diseases mentioned. The photopic and scotopic electroretinograms were both subnormal, with impairment of secondary dark adaptation. Residues of several organophosphorus pesticides, including parathion but not malathion, were detected in the patient's blood, and his pseudocholinesterase level was depressed. Administration of atropine and pralidoxime was effective in eliminating these anomalies. Hemeralopia and other visual disturbances were improved upon disappearance of the general symptoms; however, the abnormalities remained. Cases of this type have only been reported among persons who used organophosphate pesticides. (Presented at Alumni Meeting, School of Ophthalmol., Kyoto Univ., Oct. 14, 1973.)

74-1107. Smetanin, N. I. (Author address not given). **Otklik na stat'yu doktora med. nauk Ye. I. Spynu, K. K. Vrochinskiy, T. D. Zor'eva, N. N. Man'ko, "Kompleksnoye gigiyenicheskoye normirovaniye novykh fosfororganicheskikh pestitsidov v ob"ektakh vneshney sredy." [Reply to the article by Drs. Ye. I. Spynu, K. K. Vrochinskiy, T. D. Zor'eva, and N. N. Man'ko, "Complex hygienic standardization of new organophosphate pesticides in the environment".]** *Gig. Sanit. 38(9): 83-84; 1973.* (Russian)

A method proposed for the complex hygienic standardization of new organophosphorus pesticides in the environment, published in *Gigiyena i Sanitariya*, No. 11, 1972, p. 96 (see abstract No. 73-1018), is challenged on the grounds of failure to take into account such factors as differences in the human physiological and environmental conditions, synergism between pesticides and other contaminants, and the dynamics in the exposure to organophosphorus pesticides. The minimum doses and maximum allowable concentrations of organophosphorus pesticides are conditioned by age, sex, health status, and living and working conditions; by the environment (rural or urban); and by nutritional characteristics. The action of pesticides on the human body is intermittent and irregular in both duration and intensity.

74-1108. Friedman-Mor, Z.; Pollak, E. (Emergency Ward, Hadassah Med. Cent., Jerusalem, Israel). **[Poisoning by organophosphate compounds following use as a hair-rinse against lice.]** *Harefuah 82(6): 278-281; 1972.* (10 references) (Hebrew)

Fifteen children were hospitalized at Hadassah Medical Center in 1970-1971 for poisoning by organophosphate pesticides applied as hair rinses. Fourteen recovered, and one child was pronounced dead on arrival. Diagnosis was based on the clinical picture since the parents were not able to provide adequate information concerning the history of poisoning. Symptoms included vision disorders, impaired respiration, hypersecretion, abdominal pain and diarrhea, muscular weakness, loss of bladder control, restlessness, cyanosis, and lability of blood pressure. Cholinesterase depression varied with amount and route of poison ingestion. A blood cholinesterase level of zero was determined in the one child, a 12-year-old girl, who was declared dead on arrival, and her blood pH was 6.8. Treatment comprised administration of atropine and pralidoxime and maintenance of a clear airway. The widespread use of organophosphates in agriculture leads to the possibility of misuse; if public education cannot prevent the occurrence of poisonings, a ban on uncontrolled sales of organophosphates may be necessary.

74-1109. Akhter, M. S.; Bhide,N. K. (Dept. Pharmacol., All-India Inst. Med. Sci., New Delhi, India). **A note on PAM—an antidote for organophosphorus insecticide poisoning.** *Indian Pediatr. 10(9): 563-564; 1973.*

Organophosphorus compounds, the exclusive or primary ingredients of most modern insecticides, can be absorbed from intact skin; poisoning occurs if they are inhaled or swallowed. Organophosphorus compounds are highly toxic in that they irreversibly phosphorylate and block the acetylcholinesterases, upsetting the function of all smooth muscles, exocrine glands, voluntary muscles, heart, autonomic ganglia, and the central nervous system. 2-Pyridine aldoxime methochloride (PAM) reactivates the phosphorylated blocked cholinesterase, thus acting as the specific antidote in organophosphorus poisoning. PAM should not be used as a substitute for atropine, which should be given repeatedly to antagonize the dangerous effects of the organophosphorus insectides on the smooth muscles, heart, secreting glands, and central nervous system. PAM should supplement atropine therapy to reverse the paralyzing effects of the insecticides on the voluntary muscles and be used as early as possible for best results. In severe cases, PAM can be repeatedly injected. The patient should be closely watched for at least 72 hours since respiratory paralysis may also occur and the symptoms may reappear at any stage.

74-1110. Ensberg, I. F. G.; de Bruin, A.; Zielhuis, R. L. (Coronal Lab., Faculty Med., Univ. Amsterdam, The Netherlands). **Health of workers exposed to a cocktail of pesticides.** *Int. Arch. Arbeitsmed. 32: 191-201; 1974.* (19 references)

Men who are normally healthy and have occupations (agriculture, horticulture, floriculture, industry) involving exposure to pesticides were compared with a group of controls regarding a variety of health parameters. Workers subjected to moderate to intensive exposure to pesticides for more than 4 years (Group A) experienced significantly more subjective symptoms than controls or workers exposed for less than 4 years (B), or workers subjected to slight to moderate exposure (C). Group A had a nonsignificant increase in minor neurological symptoms (hyporeflexia, areflexia, tremor,

incoordination) and groups A, B, and C had significantly more skin diseases than controls. The exposed groups, particularly A, also differed significantly in various biochemical parameters from controls; there were no consistent patterns in these deviations. Exposure as great as Group A (at least 50 to 100 times that of the general public) adversely affects health. Workers exposed less do not appear to suffer significant adverse effects.

74-1111. Yamamoto, K.; Kinoshita, K.; Uchihira, T. (Sch. of Dermatol., Fac. of Med., Yamaguchi Univ., Ube City, Yamaguchi, Japan). **[A case of secondary erythroderma possibly due to BHC.]** *Karute (Case Hist.) 6(4): 61-62; 1973.* (Japanese)

An elderly farm woman who had suffered from general exanthema with pruritus from unknown causes accompanied by erythemae, desquamation, and exudation since Oct. 1969 experienced a general redness with increased pruritus after scattering BHC formulation in July 1970. Medical treatment was intermittent. During a hospital visit in March 1971, she complained of pruritus on both legs, edema on her face, and general exanthema. Clinical examinations revealed nothing except that the No. 5 band of isozymes of LDH was a little higher than the No. 4 band. Suspecting hypersensitivity to pesticides, patch tests were carried out with 1, 0.1, and 0.01% DDT, respectively, with negative results. BHC tests had negative results with 0.001 and 0.01% but positive ones with 0.1 and 1%. Other patch tests with her hair dye and administration of Kerorin (a drug for headache used frequently) were negative. From these findings it was first concluded the condition was caused by primary exanthema which induced contact dermatitis. However, when the case history was considered, she was diagnosed as having secondary erythroderma due to BHC.

74-1112. Takeuchi, K.; Kamo, H. (Misho Health Center, Ehime, Japan). **[Countermeasures against pesticide injuries and integrated action for maintaining health—a report of investigation of pesticide injuries in Misho Town.]** *Koshu Eisei Joho (Pub. Health Inform.) 3(11): 24; 1973.* (Japanese)

An investigation was carried out July-Oct. 1971 in the Waguchi district of Misho on 315 farmers. Interviews determined awareness of pesticide hazards. Pesticide storage conditions were examined. Actual pesticide use, health of farmers (through urinalysis, blood pressure, ECG, blood picture, eye fundus, liver function, and visual field), and residues in fish and soil were determined. The number of persons using pesticides was 46 in Aug. and 39 in Sept.; total number of applications was 290 in Aug. and 191 in Sept.; the average number of days used for pesticide application was 5.7 per person. Masks were worn by 93.4%, goggles by 15.2%. Gloves were not worn by 60.9%, boots by 82.6%. Adverse effects included diarrhea, abdominal pain, weariness, ophthalmalgia, and ocular hyperemia. Pesticides causing multiple symptoms were fenitrothion plus 2-*sec*-butylphenyl *N*-methyl carbamate (Osbac), Amiphos (DAEP), and Hinosan. About 81% of the cases continued applications. Empty bottles of pesticides were thrown away in fields (41%), in the mountains (21%), and in the river (31%). The morbidity was 70% of 146 examined persons. Disorders included anemia (28 persons), hypertension (20 persons), and heart disease (15 persons). Seven out of 42 persons showed abnormalities in liver function. Three of them had actual dysfunction. The cholinesterase activity ranged from 0.6-1.2 Δp/hr with central value of 0.8. Guidance and education on pesticides is necessary to prevent injuries.

74-1113. Hurtig, H. (Res. Branch, Canada Dept. Agr., Ottawa, Canada). **The government viewpoint.** *Manitoba Entomol. 5: 28-39; 1971.*

Policies adopted by governments for the regulation of pesticides must be designed to accommodate new information as it is obtained, be applicable to an extended period of time, and ensure industry participation. In Canada 17 federal and 102 provincial acts have some bearing on the use of pesticides, and 5 departments at the federal level are involved. In the 1970's, pesticide regulation will be closely tied to control of pollution of soil, air, and water. It is expected that a new body will be formed in Canada for policy interpretation and advice, program review and program assessment, although the resource based agencies will probably still be responsible for their own research, regulation, and education programs. A number of organochlorines and parathion were reviewed, and in 1971 a reduction in their uses will become effective. It is of primary importance that replacement chemicals be carefully studied both before and after approval.

74-1114. Anonymous. **Report of the National Poisons Service for 1970.** *Med. J. Aust. 1(7): 291; 1972.*

During 1970, the National Poisons Service of Australia received 8,191 reports of poisoning with 65 fatalities. Of these, 419 cases and 10 fatalities involved pesticides, fertilizers, and plant feeds. Apart from therapeutic drugs, kerosene and pesticides were the commonest causes of poisoning in children. Poisoning among children, particularly those under 5 years of age, continues to be a serious problem. Public carelessness and ignorance regarding the hazards and safe hadling and storage of drugs and poisons indicate a need for intensive educational programs relating to this matter. There is also a need for safer containers and packagings for such substances.

74-1115. Iwaya, Y.; Tanaka, Y. (Dept. Int. Med., Nakadori Hospital, Akita City, Akita, Japan). **[A case report of death by an organophosphorus insecticide, and the**

first-aid and the treatment of organophosphorus intoxication.] *Medical Reports of Nakadori Hospital 14(7): 332-337; 1973.* (2 references) (Japanese)

A 49 year old male public official with a history of hospitalization for impaired liver function was found in a coma and foaming at the mouth after swallowing about 50 ml of trichlorfon concentrate. At hospitalization, he was comatose with irregular and shallow respiration which subsequently failed and with weak and rapid pulse and arrhythmia. Miosis with obscure light reflex was observed. Treatment included artificial respiration, gastric lavage, and administration of 80 ml of PAM and steroids and diuretics. Respiration improved although coma and miosis continued. Two days later he had improved to the point of somnolence. Another 40 ml of PAM was intravenated by drip resulting in unequal pupils with confirmed light reflex. Meiron was given to correct the metabolic acidosis. An intra-tracheally inserted tube was removed when respiration stabilized. Afterwards, symptoms of repeated muscle rigor and weakness in extremities appeared without any abnormal reflex or accentuation of reflex. Sedatives were given to control agitation. Three days after ingestion pulse and respiration increased and blood pressure decreased to 60 mmHg. He died soon after. Urinalysis showed the gradual increase of protein, sugar, erythrocytes, and leucocytes. The immediate cause of death was attributed to suffocation.

74-1116. Spratt, J. S., Jr. (Columbia, MO). **Your behavior and cancer.** *Mo. Med. 71(1): 22A-24; 1974.*

Diet appears to be related to various forms of cancer. Food may contain cancer inducing chemicals including pesticides like DDT which are known to produce tumors in the lung and lymphoid organs in experimental animals. Fish, red meat, and milk supplies in many parts of the country contain significant DDT levels, and the average person in the United States has 12 ppm DDT in his fatty tissue. Factors which could help prevent the development of cancer in the individual are discussed, as are symptoms which may indicate the presence of cancer.

74-1117. Bremer, R. (Bezirks-Inst. fuer Veterinaerwesen Potsdam, Bienenschutzstelle der DDR, Postdam, DDR). **Analyse der durch Pflanzenschutzmittel verursachten Schaeden an Bienen und Wege zu ihrer Verringerung. [Analysis of bee injuries caused by insecticides and ways of reducing them.]** *Nachrichtenbl. Pflanzenschutzdienst DDR 27(10): 208-209; 1973.* (3 references) (German)

Statistical data on bee injuries due to the use of insecticides in plant protection and possible ways of reducing such damages are presented. In 1972, 1.95% of all bee stocks in East Germany were damaged by insecticides, compared with 2.97% in 1971, 1.05% in 1970, and 2.44% in 1966. The extent of the bee injuries, fluctuating from year to year, is dependent on the amount of insecticide used. DDT plus BHC caused 7.5% of all pesticide-related bee injuries in 1972, compared with 17.5% in 1971, and 35% in 1970. The corresponding figures for dimethoate in 1970, 1971, and 1972 are 38, 56, and 65%. Carbaryl was responsible for 3% of all pesticide-generated damages in 1971 and for 11.5% in 1972. Reasonable cooperation and communication between beekeepers and farmers, and strict observance of the instructions in the application of insecticides help minimize bee injuries due to insecticides.

74-1118. Angermann, R.; Becker, H. G. (Biol. Zentralanstalt Berlin, Akad. Landwirtschaftswissenschaften der DDR, Inst. fuer Pflanzenschutzforschung Kleinmachnow, Kleinmachnow, DDR). **Wege zur Realisierung von Neuerervorschlaegen im praktischen Pflanzenschutz. [Ways for realizing novel suggestions for practical plant protection.]** *Nachrichtenbl. Pflanzenschutzdienst DDR 27(10): 210-211; 1973.* (German).

Novel possibilities for the field trials of new pesticides prior to official acceptance and for improving pesticide distribution techniques and equipment are outlined. The new regulations concerning plant protection in East Germany permit the use of only officially approved pesticides and only at specified rates and concentrations, as well as with the equipment necessary. The regulations apply to the entire country, but exceptions can be made for specific types of soils. Trials of new candidate pesticide preparations by plant protection workers can constitute a valuable contribution to the official tests.

74-1119. Anonymous. **A special case for DDT treatment?** *Nature (London) 246(5427): 5-6; 1973.*

The Environmental Protection Agency is faced with the dilemma of temporarily lifting the ban on DDT to control an infestation of Douglas fir tussock moth or risking defoliation of a million acres of forest in the Pacific Northwest. The virus infection which usually controls the outbreaks did not work. The agency last year allowed experimental use of Zectran (mexacarb), Dylox (trichlorfon), Sevin-4-oil (carbaryl), and Bioethanmethrin, but these were only moderately effective. The polyhedrosis virus and *Bacillus thuringiensis* proved to be promising against the caterpiller, but these are not available in sufficient quantity for a large outbreak. Exemption from the DDT ban has already been granted in Washington to kill pea leaf weevil.

74-1120. Ishikawa, S. (Sch. of Ophthalmol., Fac. of Med., Kitasato Univ., Sagamihara City, Kanagawa, Japan). **[Chronic optic neuropathy due to environmental exposure to organophosphorus pesticides (Saku disease).]** *Nippon Ganka Gakkai Zasshi (J. Jap. Ophthalmol. Soc.) 77(10): 1835-1886; 1973.* (132 references) (Japanese)

An epidemiologic investigation of Saku disease, the name coined by the author for ophthalmologic disorders produced by prolonged contact with organophosphorus pesticides, included examinations of 324 children and 255 adults between 1966 and 1972. Cases for examination were selected according to diagnostic criteria proposed by the Japan Health and Welfare Department, and a high degree of correlation between groups of findings was obtained. Ocular signs included diminished visual acuity, narrowing of the peripheral visual field and/or central scotomas, myopia, and sometimes astigmatism. Systemic signs included pyramidal and autonomic abnormalities. Laboratory tests demonstrated organophosphate pesticide levels above 0.01 ppm in blood or urine, reductions of cholinesterase activity, and liver function abnormalities. Sensory and motor nerve disturbances were sometimes present. Similar constellations of findings were seen in beagles given ethylthiometon orally at 5, 10, or 15 mg/animal/day for 2 years. The similarities of findings in the cases studied indicated that Saku disease can indeed be regarded as a valid disease entity, and chronic organophosphate intoxication is the probable cause.

74-1121. Shiina, Y.; Munekata, J. (School of Dermatol., Nihon Medical College, Tokyo, Japan). **[On the patch test, its practice and literature.]** *Nippon Ika Daigaku Zasshi (J. Nippon Med. Sch.) 40(5): 322-334; 1973.* (87 references) (Japanese)

A review on the patch test based on the experiences of out patients in a local hospital and literature is presented. The patch test can be carried out with small areas of skin and can simultaneously test many suspicious materials under the same conditions. It can be carried out on any area on the body surface and provides control over allergen contact by selection of concentrations. With the patch test a doctor can discriminate between allergic contact dermatitis and toxic contact dermatitis. Clinically, this is based on history of contact with a certain substance, re-occurrence of dermatitis through contact, and substance specificity of the skin reaction. A diagnosis of allergy is made when the test is positive even at low concentrations. Further examinations are carried out morphologically or histochemically. Several methods are described and the substances utilized enumerated. The last series tested included the pesticides cupric sulfate, thiram, nicotine sulfate, BHC, and DDT, in aqueous solution, alcoholic solution, or mixed with vaseline.

74-1122. Nakamura, I.; Maeda, M.; Mori, M.; Miki, S.; Teranishi, Y. (Dept. Int. Med., Takasago Citizens Hospital, Takasago City, Hyogo, Japan). **[A case of intoxication due to paraquat dichloride.]** *Nippon Naika Gakkai Zasshi (J. Jap. Soc. Intern. Med.) 62(10): 1394; 1973.* (Japanese)

A housewife, age 43, committed suicide by swallowing about 20 ml of 24% paraquat formulation. She was found in pain complaining mainly of tightness in the chest. She was hospitalized conscious, and urine production decreased. After gastric lavage, she was moved to another hospital; rapid pulse, feeble respiration, jaundice in bulbar conjuctiva, and tenderness in the epigastrium were recognized. Tests showed BUN 76.5 mg/dl, serum creatinine 5.1 mg/dl, total bilirubin 7.0 mg/dl, GOT 194 U, GPT 160 U, serum sodium 135 mEq/l, potassium 4.3 mEq/l, chloride 96 mEq/l. Slight acidosis was noted. In spite of substitution infusion and administration of diuretic soon after hospitalization, dyspnea and bleeding of digestive tract occurred, with aggravated convulsive paroxysms and jaundice. She died two days after poison ingestion. On autopsy, general bleeding and congestion were noticed as well as cellular denaturation in kidney tubules, and cellular proliferation, partial fatty degeneration, and cellular infiltration of Glisson's capsule of the liver. A lethal dose of 24% paraquat-dichloride is said to be 12-13 ml. It has been reported that paraquat-dichloride caused degeneration of adrenal cortex; however, this was not clear in this patient, and death was attributed to respiratory failure, liver and kidney failure accompanied by abdominal symptoms and neurosis. (A lecture at the LXXIX meeting of Kinki-Branch of Jap. Soc. Intern. Med.)

74-1123. Anonymous. **[Notice from the Ministry of Agr. and Forestry to prevent accidents caused by mixing primary calcium phosphate and calcium polysulfide.]** *Noyaku Bijinesu (Pestic. Business) 3(127): 1; 1973.* (Japanese)

After an accident caused by mixing primary calcium phosphate and calcium polysulfide in a field the Ministry of Agriculture and Forestry issued a notice to the Governors of Prefectures in the name of the Chief of Agr. Raw Silk and Horticult. Bureau. The message stated that recently, an accidental death was caused by mixing primary calcium phosphate and calcium polysulfide for application. Mixing the two substances causes poisonous hydrogen sulfide to evolve and precipitates serious accidents; therefore, it is herewith hoped to instruct the cities, towns, villages and people concerned not to mix the above mentioned two substances. Further information advised that the notice be posted and printed on the packaging of the respective substances.

74-1124. Davies, J. E. (Dept. Med., Univ. Miami, Miami, FL). **Pesticides and the environment.** *Pan Amer. Health Organ. Sci. Publ. 256: 35-43; 1973.* (17 references)

Since carbamate and organophosphate insecticides have replaced organochlorines, the incidence of pesticide poisonings has increased. Illicit sale of parathion and other organophosphates, lack of awareness of the increased hazards, improper disposal of containers, and improper maintenance of warehouses have been respon-

sible for many such poisonings. Symptoms usually appear 2-4 hr after skin exposure or 15-60 min. after ingestion, and are due to ChE inhibition. Treatment should be begun before diagnosis is confirmed by plasma ChE and urinary insecticide or metabolite determinations. Restoration of the airway and the correction of hypoxia, administration of atropine and in some cases pralidoxime, and decontamination are essential. Occupational poisonings can be reduced by proper education, protective clothing and removing persons from exposure when red blood cell ChE falls below 0.40 ΔpH/hr. Unlike the organophosphates DDT has had no unequivocal effects on man except deposition of residues in the fat. Diet is the primary source of DDT in human tissue, but in warmer climates non-dietary sources may be equally important. International development of multidisciplinary protection teams is essential to coping with the problems presented by changing pesticide technology.

74-1125. Hoebold, E.; Sittig, E. (Staatliches Apothekenwesen des Kreises Bitterfeld, Bitterfeld, DDR). **Moeglichkeiten der Kontrolle zur Einhaltung von gesetzlichen Bestimmungen bei Giften, Pflanzenschutz- und Schaedlingsbekaempfungsmitteln in der sozialistischen Landwirtschaft. [Possibilities to control the observation of legislative rules concerning poisons, herbicides, and pesticides in socialist agriculture.]** *Pharm. Praxis 12: 266-268; 1972.* (1 reference) (German)

Possibilities for ensuring the enforcement of legislative rules concerning drugs, pesticides, and other toxic materials in agricultural and industrial enterprises in East Germany are described. Regular inspections of poison stores and cabinets and of the related documentation constitute an enforcement method. Inquiries and actual inspections revealed serious insufficiencies in the handling and storage of poisonous materials on agricultural premises and ignorance of the legislative rules to be observed in many cases.

74-1126. Brown, I. P. (North East Metropolitan Regional Poisons Cent., Oldchurch Hosp., Romford, Essex, England). **Clinical toxicology. X. Poisoning in children.** *Practitioner 211(1264): 553-558; 1973.*

There is a much higher incidence of poisoning by household substances such as disinfectants, weed-killers, and phenolic compounds among children under five years of age than among adults. Poisoning is generally accidental in children. Those substances ingested by children which have caused serious concern in the Oldchurch Hospital Poisons Center are salicylates, iron preparations, tricyclic antidepressants, appetite suppressants, petroleum products, and plants. The relatively high incidence of accidental poisoning can only be diminished by an increased awareness of the problem by parents and others responsible for young children.

74-1127. Clarke, E. G. C. (Chem. Toxicol. Dept., Royal Vet. Coll., England). **Clinical toxicology. XII. Poisoning in domestic animals.** *Practitioner 211(1266): 818-822; 1973.*

When coping with poisoning in domestic animals, the veterinarian must deal with a wide range of poisons as well as the differences in the responses to these poisons by members of different species. Substances posing potential threats to domestic animals include poisonous plants, lead, and fluorine. The rodenticides warfarin and α-chloralose are poisonous to all animals, but fatalities among domestic animals inadvertently poisoned can be prevented. Rodenticides also pose a threat in terms of secondary poisoning. Insecticides, another group of substances of considerable importance in veterinary toxicology, fall into two main classes: organophosphorus, very toxic; organochlorine, very persistent. Due to a better understanding of the risks involved and more stringent safety regulations, poisoning by insecticides is much less common than in the past. The diagnosis and treatment of poisoning in domestic animals follow similar procedures to those used with human patients.

74-1128. Embry, T. L. (Univ. Arizona Coll. Med., Tucson, AZ 85721). **Search for abnormalities of heme synthesis and sympathoadrenal activity in workers regularly exposed to pesticides.** *Tex. Rep. Biol. Med. 30(2): 203; 1972.*

A comparison of 49 control and 45 pesticide-exposed workers showed no differences in urine porphyrins, δ-amino-levulinic acid, porphobilinogens and free catecholamines. Serum pesticide contents, serum ChE activities, and urinary excretion of pesticide metabolites were used to determine extent of exposure to DDT, dieldrin, toxaphene, parathion, and other chemicals. Chronic exposure to these pesticides apparently does not produce a defect in heme synthesis or disturb sympathoadrenal activity.

74-1129. Scadding, J. G. (Dept. Thoracic Med., Cardio-Thoracic Inst., Brompton Hosp., London SW36HP, England). **Diffuse pulmonary alveolar fibrosis.** *Ther. Umsch. 30(3): 191-198; 1973.* (23 references)

"Alveolitis" has been suggested as a designation for a number of diseases involving inflammation in the peripheral gas-exchanging part of the lungs predominantly affecting the alveolar walls. Not dealt with in detail, but included in this category of diseases, is a small group in which changes occur in response to certain chemicals (such as paraquat) reaching the lung by the bloodstream. Inflammation can be treated with corticosteroids, but established fibrosis is unaffected by removal of the toxic element or corticosteroid treatment.

74-1130. Oehme, F. W. (Comparative Toxicol. Lab., Kansas State Univ., Manhattan, KS 66506). **Significance of chemical residues in United States food-producing animals.** *Toxicology 1(3): 205-215; 1973.* (49 references)

Problems caused by residues in food-producing animals result from the feeding or application of the following classes of compounds: antibiotics, drugs other than antibiotics, pesticides, and heavy metals and trace elements. Low-level pesticide residues in human food can stimulate enzyme induction, act as alkylating agents in cells, alter steroid metabolism, exert teratogenic and mutagenic effects, and affect memory and behavior. The replacement of organochlorine pesticides by organophosphates and carbamates has lessened residue problems but has increased the incidence of clinical poisoning in man and animals. While Federal regulatory agencies are attempting to formulate guidelines for residue control, the potential social, health, and political consequences are far-reaching. International cooperation in solving the problems related to the occurrence of chemical compounds in tissues is encouraged.

See also **74-1017** **74-1022** **74-1033** **74-1037** **74-1177** **74-1228** **74-1249**

74-1131. Wegrzyn, T. (Dept. Agr. Microbiol., Coll. Agr. Wroclaw, Norwida 25, Poland). **The effect of some herbicides on *Azotobacter chroococcum.*** *Acta Microbiol. Pol. 3(3): 131-134; 1971.* (6 references)

Urea compounds were more toxic than other herbicides to *Azotobacter chroococcum* grown in liquid or on agar medium. With doses of 1000 and 100 ppm, but not 10 and 1 ppm of CIPC (chlorpropham), tenoran (chloroxuron), aresin (monolinuron), atrazine, and eptam (EPTC), the number of colonies on plates decreased. Aphalon (linuron) had the greatest effect on the development of these organisms. Slow growing rough strains were more sensitive than rapidly growing mucoid ones, and morphology of the different strains was affected by some of the herbicides. Aphalon, CIPC, and prometryne inhibited nitrogen fixing activity of *A. chroococcum*; aphalon was the most toxic in this regard.

74-1132. Wolburg, I. (Deut. Zentralinst. Arbeitsmed. der DDR, Fachbereich Arbeitsphysiol., Berlin-Lichtenberg, DDR). **Die Anwendung der Elektroenzephalographie in der Industrietoxikologie. [The use of electroencephalography in industrial toxicology.]** *Activ. Nerv. Super. 15(3): 226-235; 1973.* (36 references) (German)

Studies on the electroencephalographic manifestations of poisoning by various industrial poisons, including pesticides, and of infections are reviewed. During and following the 3 months that 1/10 to 1/25 LD50 doses of BHC to rabbits were orally administered, atypical electroencephalograms were obtained under the conditions of light flash-induced arousal. The percentages of atypical curves exceeding 1% were 42% in a group treated with 7.5 mg/kg doses, and 82% in another group treated with 15 mg/kg doses of BHC. The proportion of slow, high-potential waves and of high-potential peaks increased under the influence of BHC. Dichloromethane, administered to rats in doses of 1,000 ppm and 3,000 ppm, increased the proportion of the total sleep and simultaneously reduced the duration of the paradoxical sleep.

74-1133. Fujimoto, K.; Itaya, N.; Okuno, Y.; Kadota, T.; Yamaguchi, T. (Research Dept, Pesticide Div., Takarazuka Lab., Sumitomo Chem. Ind. Co. Ltd., Takarazuka City, Hyogo, Japan). **[A new insecticidal pyrethroid ester.]** *Agr. Biol. Chem. 37(11): 2681-2682; 1973.* (8 references)

The LD50 values of a new synthetic pyrethroid insecticide, Phenothrin (3-phenoxybenzyl chrysanthemate), were determined in mice given the chemical p.o. Values were established for the isomers *dl-trans, cis; d-trans, cis; d-trans; d-cis;* and *l-trans*: > 5000, > 5000, > 10,000, 480, and > 5000 mg/kg. These were compared to those of 3-benzylbenzyl, 3-phenylthiobenzyl chrysanthemate, tetramethrin, pyrethrin, resmethrin, furamethrin, *d*-furamethrin, allethrin, and *d*-allethrin: > 5000, > 100, 1220, 130, 300, 3130, 1950, 410, and 440 (mg/kg body weight of mouse). The toxicity to several insects was also compared.

74-1134. Sumida, S.; Yoshihara, R.; Miyamoto, J. (Res. Dept. Pestic. Div., Sumitomo Chemical Co., Ltd., Hyogo-ken, Japan). **Degradation of 3-(3′,5′-dichlorophenyl)-5,5-dimethyloxazolidine-2,4-dione by plants, soil and light.** *Agr. Biol. Chem. 37(12): 2781-2790; 1973.* (14 references)

Studies on uptake, tissue distribution, and metabolism of 3-(3′,5′-dichlorophenyl)-5,5-dimethyloxazolidine-2,4-dione (DDOD) by bean and grape plants, and degradation by soil and light were carried out using ^{14}C- or ^{3}H-DDOD. DDOD injected at stem or absorbed through roots of bean plants was transported mainly to leaf tissues. No downward movement of the label was observed. DDOD was decomposed in the nutrient solution to *N*-3,5-dichlorophenyl-*N*-α-hydroxyisobutyl carbamic acid (DHCA) and α-hydroxyisobutyl-3,5-dichloroanilide (HDA). Metabolism of DDOD in bean plants or on grape berries themselves occurred to only a small extent if at all. When injected into grape trees, DDOD underwent some degree of metabolization to HDA and probably 3-(3′,5′-dichloro-4′-hydroxyphenyl)-5,5-dimethyloxazolidine-2,4-dione. In soil, DDOD broke down to DHCA, HDA, and 3,5-dichloroaniline, but formation of tetrachloroazobenzene was not observed under the present experimental conditions. DDOD decomposed to some degree when irradiated with a xenon lamp. (Author abstract by permission)

74-1135. Gawaad, A. A. A.; Hammad, M.; El-Gayar, F. H. (High Institute of Cotton, Plant Protection Dept., Alexandria, Egypt)). **Nehany inszekticid hatasa a talajmikroorganizmusokra. [Effect of some soil insecticides on soil microorganisms.]** *Agrokem. Talajtan 22(1-2): 161-168; 1973.* (9 references) (Hungarian)

The insecticides kepone (chlordecone), endrin, lindane, dyfonate, and PP-221 (a phosphoric acid ester) were applied in doses of 22, 22, 22, 11, and 11 kg/ha, respectively, to study their effects on the counts and activities of soil bacteria and fungi in eight different soils in the Nile delta. The total number of microorganisms decreased during the first week after application and subsequently increased considerably for another seven days. After 15 days the total number of microorganisms returned more or less to its normal level. Carbon dioxide production, an indicator of the activity of the microorganisms, followed nearly the same pattern. The stoong increase in both the count and the activity of the soil fungi after the first seven days was most probably due to the intense breakdown and detoxification of the pesticides by these microorganisms.

74-1136. Gawaad, A. A. A.; Hammad, M.; El-Gayar, F. H. (High Institute of Cotton, Plant Protection Dept.,

Alexandria, Egypt). **Inszekticidek hatasa a nitrogen tranformaciojara a talajban. [Effects of some soil insecticides on the nitrogen transformation in treated soils.]** *Agrokem. Talajtan 22(1-2): 169-174; 1973.* (9 references) (Hungarian)

The effects of kepone, endrin, dyfonate (O-ethyl-S-phenyl ethyl dithiophosphonate), and PP 211 (phosphoric acid ester) were studied on the nitrogen microbial transformation in treated soil. Kepone, endrin, dyfonate, and PP 221 were applied at the respective rates of 22, 22, 11, and 11 kg active ingredient per ha. The results obtained indicate that the soil insecticides decreased ammonification of peptone and nitrification of ammonium sulfate. Although nitrites accumulated in the treated soils, the nitrate level decreased during the first 15 days. Soil insecticides, especially organochlorine compounds, affected fungi, actinomycetes, and bacteria responsible for ammonification and *Nitrobacter* responsible for converting nitrites into nitrates. They did not affect *Nitrosomonas* which convert ammonia into nitrates.

74-1137. Bello, T. R.; Amborski, G. F.; Torbert, B. J. (Dept. Vet. Sci., Louisiana State Univ., Baton Rouge, LA 70803). **Effects of organic phosphorus anthelmintics on blood cholinesterase values in horses and ponies.** *Amer. J. Vet. Res. 35(1): 73-78; 1974.* (8 references)

Blood ChE activity decreased to about 14% by 24 hr in Quarter Horse weanlings, yearlings, and pregnant mares given 35.8 mg/kg of dichlorvos resin-pelleted formulation in the feed for 1 day, and activity increased to about 98% in 7 or 8 wk. The same dose level of a mixture of phenothiazine and trichlorfon reduced the ChE activity to 27% in Quarter Horse mares by 24 hr; activity in these animals was 81% of pretreatment levels by 8 wk. Inhibition of ChE activity was less and recovery was more rapid when a therapeutic dose of anthelmintic was given all at once by stomach tube. A combination of trichlorfon, piperazine, and phenothiazine given by this method to nonpregnant mares and pregnant mares one month before foaling reduced ChE activity to 39.9% in 24 hr. Foals born to these animals 3-4 wk later were normal. Similar treatment of pregnant pony mares 1 wk before foaling caused the same reduction of ChE, but the mares had three normal foals, one dead foal removed by cesarean section, and one stillborn foal. Dichlorvos paste formulation given to pony foals reduced activity to 37% in 24 hr. Complete recovery was observed in 3 wk. Clinical signs of exposure to organophosphates were only observed in pony foals given excessive doses of SD 15803 in which 0% ChE activity was recorded at 24 hr.

74-1138. Hurwitz, S. (New Haven, CT). **Scabies in babies.** *Amer. J. Dis. Child. 126: 226-228; 1973.* (11 references)

Five case histories of scabies in babies illustrate the slow response to treatment with BHC or crotamiton in this group. While most members of the families who had contracted the disorder responded after several topical applications of 10% BHC or crotamiton, the babies required weekly applications for up to two months. The presence of more mites in this age group and the possible development of resistance could account for the delay Caution should be used in administering BHC to small children and infants with whom absorption is a consideration.

74-1139. Amir, D.; Ben-David, E. (Div. Anim. Reproduction, Agr. Res. Org., The Volcani Cent., P.O. Box 6, Bet Dagan, Israel). **The pattern of structural changes induced in bull spermatozoa by oral or injected ethylene dibromide (EDB).** *Ann. Biol. Anim. Biochem. Biophys. 13(2): 165-170; 1973.* (9 references)

Abnormalities including coiled tails, acrosomic defects, and acrosomic loss were observed in 25 to 98% of spermatozoa in ejaculates of bulls during the 3rd week after initiation of administration of 4 mg/kg ethylene dibromide (EDB) every other day for 19 days. The percentage was higher from the 4th week until about 40 days after the start of treatment, and 60 to 70% showed some degree of disintegration and degeneration. About 1 month after discontinuation of treatment, evidence of recovery was noted. During the 3rd week after injection beneath the tunica vaginalis with 220 to 240 mg of EDB, about 50% of the spermatozoa were abnormal and during the 4th and 5th weeks, up to 80% of the spermatozoa were abnormal. Normal ejaculates were collected about 2 months after injection.

74-1140. Schroeder, H. W.; Cole, R. J.; Grigsby, R. D.; Hein, H., Jr. (Agr. Res. Serv., U. S. Dept. Agr., College Station, TX 77840). **Inhibition of aflatoxin production and tentative identification of an aflatoxin intermediate "versiconal acetate" from treatment with dichlorvos.** *Appl. Microbiol. 27(2): 394-399; 1974.* (10 references)

In general, aflatoxin production by *Aspergillus flavus* and *A. parasiticus* was greatly reduced in vitro in the presence of the insecticide dichlorvos. Reduction in yield of the toxins was accompanied by the appearance of a previously unidentified orange pigment. Spectral analyses of the pigment and of its methylated and acetylated derivatives indicated the compound to be versiconal acetate (IV). The data suggest that IV is an intermediate in the metabolic cycle that may terminate in the production of aflatoxin or of the versicolorins, or both. Dichlorvos apparently inhibits biosynthesis of the difurano ring structure common to the aflatoxins and the versicolorins. (Author abstract by permission)

74-1141. Lehner, P. N. (Dept. Zool. Entomol., Colorado State Univ., Fort Collins, CO 80521). **Failure of**

dieldrin to affect color vision in juvenile mallard ducks. *Arch. Environ. Contam. Toxicol. 1(4): 303-311; 1973.* (25 references)

Juvenile mallard ducks raised artificially from eggs of ducks fed dieldrin at 0, 4, and 10 ppm for two years were fed the same dose as their parents and tested at two months of age for response to light wavelengths. Three ducks from the 10 ppm parents were fed 50 ppm dieldrin. When trained to respond positively to 552 and negatively to 610 nm, ducks were exposed to 13 different wavelengths in random order. No significant differences in mean stimulus generalization gradients were observed between controls and dieldrin-treated ducks, suggesting that ingestion of the pesticide at the levels tested does not have a measurable effect on color vision in mallard ducks. Only the 50 ppm group showed a significantly higher whole brain dieldrin content than that of controls.

74-1142. Fang, S. C.; Fallin, E. (Dept. Agr. Chem., Oregon State Univ., Corvallis, OR 97331). **Uptake, distribution, and metabolism of inhaled ethylmercuric chloride in the rat.** *Arch. Environ. Contam. Toxicol. 1(4): 347-361; 1973.* (22 references)

Residues of radioactive mercury in various organs and tissues of rats exposed to 5 or 85 nmoles of labeled ethylmercuric chloride (EMC) per liter of air generally increased with time over a 24-hr period. Using a 24-hr time point, a dose response was also observed. Hair and kidneys contained 5666 and 61.0 nmoles/g, respectively, following exposure for 24 hr to 85 nmole/l. The next highest residue occurred in the liver. A small amount of EMC was found in the fetus when pregnant rats were studied. Uptake was similar in animals exposed through inhalation and those given 3 μmol of EMC orally in a single dose, but mercury remained in the tissues and organs longer after pulmonary exposure than after ingestion. The percent of inorganic mercury increased with time, indicating that biotransformation of EMC is a continuous biological process.

74-1143. Fischer, G. W.; Lohs, K. (Akad. der Wissenschaften der DDR, Forschungsstelle fuer Chemische Toxikol., Leipzig, DDR). **Zur Einschaetzung des Alkylierungspotentials onkologisch bedeutsamer Phosphorsaeureester mit Hilfe der NBP-Reaktion. [Evaluation of the alkylating potential of phosphoric acid esters with oncological relevance by means of the NBP reaction.]** *Arch. Geschwulstforsch. 42(1): 34-40; 1973.* (38 references) (German)

The alkylating potentials of the phosphoric acid esters trichlorfon, butonate, DDVP (dichlorvos), dimethoate, methyl paraoxon, methyl parathion, and bromophos were studied by a UV spectrophotometric method based on the 4-[4-nitrobenzyl]-pyridine color reaction. The reactivity of DDVP was highest; its second order reaction with NBP had a yield of 75% in 48 hrs. The rate constant of this reaction was 16.7μ/mol · sec. With conversion rates ranging from 12 to 49% in 24 hr, the reaction rate constants for methylparaoxon, bromophos, methylparathion, and dimethoate were determined to be 9.12 μl/mol·sec, 4.17μl/mol·sec, 3.29μl/mol·sec, and 1.52μl/mol·sec, respectively. Along with dealkylation of the original ester, parallel reactions occurred in the reactions of trichlorfon and butonate. Increased alkylating potentials of the metabolites of some phosphoric acid esters, such as trichlorfon and methylparathion, compared to those or the original preparations were observed.

74-1144. Hoffmann, F.; Schramm, T.; Lohs, K. (Akad. der Wissenschaften der DDR, Zentralinst. fuer Krebsforschung, Berlin-Buch, DDR). **Pruefung von Trichlorfon und Dimethoat auf Tumorhemmende Eigenschaften an Maeusetumoren. [Test on trichlorfon and dimethoate for tumor inhibitory effect in mice.]** *Arch. Geschwulstforsch. 42(1): 54-57; 1973.* (6 references) (German)

Trichlorfon and dimethoate, powerful alkylating substanees with carcinogenic properties, were investigated for tumor inhibitory effects in transplantable tumors (UV radiation-induced sarcoma in XVII strains and methylcholanthrene-induced sarcoma in CBA strains). Starting from the third day of the tumor implantation, the animals were daily administered i.p. injections of 2.52 mg of trichlorfon or 0.6 mg of dimethoate (equaling 20% of the respective LD50). All animals in the groups treated with trichlorfon and dimethoate died within 37 days and 42 days, respectively, following tumor implantation. The control animals which did not receive trichlorfon or dimethoate died 40 days after implantation. Growth of tumors was not inhibited by trichlorfon and dimethoate.

74-1145. Truhaut, R.; Boudene, C.; Cluet, J. L. (Univ. Rene Descartes, Cent. de Recherches Toxicol., Paris, France). **Toxicite de quelques derives gazeux fluores et oxyfluores du soufre. [Toxicity of some gaseous fluoride and oxyfluoride compounds of sulfur.]** *Arch. Mal. Prof. Med. Trav. Secur. Soc. 34(10-11): 581-591; 1973.* (24 references) (French)

Studies on the toxicity of some gaseous fluoride and oxyfluoride compounds of sulfur in general, and of sulfuryl fluoride, an insecticidal fumigant (Vikane), in particular, are reviewed. Sulfuryl fluoride constitutes a colorless, odorless gas with fairly high acute toxicity which is, however, lower than that of hydrogen cyanide, chloropicrin, sulfur dioxide, and methyl bromide. Exposure of rats, guinea pigs, rabbits, and monkeys to 100 ppm sulfuryl fluoride for seven hr daily, 5 days a week, caused no mortality or noteworthy lesions of the principal organs. The maximum allowable concentration of sulfuryl fluoride in industrial atmosphere is set at 5 ppm. Lethal concentrations of sulfuryl fluoride were found to cause, after a latency period of 60-90 min,

convulsions, tonic hyperextension of the limbs, and death due to respiratory paralysis within 24 hr. Concentrations in the order of magnitude of LC50 do not cause characteristic lesions of the principal organs, while concentrations of 6,000 to 10,000 ppm cause serious pulmonary congestion and hemorrhagic alveolitis.

74-1146. Satchell, D. G. (Dept. Neurol., Coll. Physicians Surgeons Columbia Univ., New York, NY). **A comparative study of the rates of metabolism, LD50's and anti-acetylcholinesterase activities of three diethylphosphoryl esters of quinolinols.** *Aust. J. Exp. Biol. Med. Sci. 51(5): 711-714; 1973.* (5 references)

Three diethylphosphoryl esters of quinolinols having the OH in the 3(I), 7(II), or 8(III), positions inhibited eel AChE at $1.85 \times 10^{-9} M$, $1.58 \times 10^{-9} M$, and $2.00 \times 10^{-4} M$, respectively. The large difference in activity observed between I and II and III was not reflected in the LD50s which were 0.128, 0.105, and 80.49 mg/kg, respectively, in mice. The rates of hydrolysis for the three compounds in the presence of mouse liver phosphorylphosphatase were approximately the same. The lethality of compounds I and II may be related to their anti-AChE activity, but the mechanism of action of compound III is probably different.

74-1147. Koelle, G. B.; Davis, R.; Diliberto, E. J., Jr.; Koelle, W. A. (Dept. Pharmacol., Med. Sch., Univ. Pennsylvania, Philadelphia, PA 19104). **Selective, near-total, irreversible inactivation of peripheral pseudocholinesterase and acetylcholinesterase in cats in vivo.** *Biochem. Pharmacol. 23(2): 175-188; 1974.* (20 references)

Tetramonoisopropyl pyrophosphortetramide (Iso-OMPA, schradan) was confirmed to be a highly selective inactivator of cat pseudocholinesterase (BuChE) over wide ranges of concentration and temperature in vitro; intravenous doses of 3.0 or 6.0 μmoles (approximately 1.0 or 2.0 mg)/kg produced nearly total inactivation of peripheral BuChE, with no detectable inactivation of acetylcholinesterase (AChE). Selective inactivation of AChE in vivo was obtained as follows: after a dose of mephentermine, 2.0 to 3.0 mg/kg, i.v., to sustain blood pressure, cats received an intravenous dose of 10-(*a*-diethylaminopropionyl) phenothiazine HCl (Astra 1397) up to 200 μmoles (73 mg)/kg, which produces selective reversible inhibition of BuChE; they were then given 1.0 μmole (0.332 mg) 2-diethoxyphosphinylthioethyl-dimethylamine acid oxalate (217 AO)/kg, which is sufficient when given alone to produce essentially total, irreversible inactivation of AChE and BuChE. Under these conditions, approximately one-third of the autonomic ganglionic BuChE, but none of the AChE, was protected and restored to activity. Quantitative results, obtained by a spectrophotometric method, were confirmed histochemically. (Author abstract by permission)

74-1148. Wins, P.; Wilson, I. B.* (Dept. Chem., Univ. Colorado, Boulder, CO 80302). **The inhibition of acetylcholinesterase by organophosphorus compounds containing a P-Cl bond.** *Biochim. Biophys. Acta 334(1): 137-145; 1974.* (16 references)

The inhibition of acetylcholinesterase (acetylcholine hydrolase, EC 3.1.1.7) from electrophorus by a number of substituted phosphono- and phosphoromono- and dichloridates was studied. Rate constants were determined for both the inhibition of the enzyme and the spontaneous hydrolysis of the inhibitors; the two parameters could be evaluated even when the half time for hydrolysis of the inhibitor was less than 1 sec. The second-order rate constant (*ki*) for enzyme inhibition was higher than 10^{-7} M^{-1} min^{-1} for most of the chloridates used; it was as high as $3 \cdot 10^{9}$ $M^{-1} \cdot min^{-1}$ for phenyl phosphorodichloridate. No correlation was found between *ki* and the rates of hydrolysis of the inhibitors used. Isopropyl methyl phosphonochloridate was only six times more potent as an inhibitor than the corresponding fluoridate (i.e., sarin) although the rate of hydrolysis of the former compound is at least 5000 times higher. In contrast, methyl phosphonodichloridate was considerably more potent than the difluoridate. The rate of phosphorylation of the enzyme by the inhibitors was decreased in the presence of reversible cholinesterase inhibitors such as substituted quaternary ammonium compounds. The enzyme inhibited by dichloridates was not reactivatable. It is an "aged" enzyme. The diphenyl phosphoryl enzyme reactivates spontaneously and rapidly. It also ages rapidly. (Author abstract by permission)

74-1149. Keijer, J. H.; Wolring, G. Z.; De Jong, L. P. A.* (Chem. Lab. TNO, Rijswijk, The Netherlands). **Effect of pH, temperature and ionic strength on the aging of phosphonylated cholinesterases.** *Biochim. Biophys. Acta 334(1): 146-155; 1974.* (23 references)

The rates of aging of cycloheptyl methylphosphonylated bovine erythrocyte acetylcholinesterase (acetylcholine acetyl-hydrolase, EC 3.1.1.7) and horse serum butyrylcholinesterase (acylcholine acyl-hydrolase, EC 3.1.1.8) have been investigated as function of pH, temperature and ionic strength. From the pH–rate profiles at 25°C and I=0.100, it was concluded that a protonated group with pK 5.84 is involved in the aging of the phosphonylated acetylcholinesterase and a protonated group with pK 7.35 in the aging of the phosphonylated butyrylcholinesterase. The influence of temperature and ionic strength on the pH–rate profile of aging of the phosphonylated acetylcholinesterase suggests the participation of an undissociated carboxyl group of the enzyme catalyzing the formation of a carbonium ion in the rate-determining step. The mechanism of aging of phosphonylated butyrylcholinesterase turned out to be more complicated. (Author abstract by permission)

74-1150. Kawai, M.; Iwahara, S.; Sasaki, Y.; Mikami, T.; Watanabe, I.; Ochiai, Y. (Medical School, Ground Self Defense Force, Tokyo, Japan). **[Pesticide interactions.]** *Boei Eisei (Nat. Def. Med. J.) 20(12): 509-512; 1973.* (7 references) (Japanese)

To obtain information concerning synergism between pesticides in acute toxicity to mammals, five organophosphates, three organochlorines, and four fungicides were tested. Pairs of these pesticides were injected subcutaneously into male dd mice, each at a LD25 dose, and mortality was observed for one week (A). The expected mortality rate (B) was calculated as the sum of the mortality rates obtained when one LD25 of each pesticide was injected individually. Effects were designated as synergistic, additive, or antagonistic, respectively, for A/B ratios of more than 1.5, 0.6-1.5, and less than 0.6. The pairs of pesticides which showed synergism were parathion + fenitrothion (A/B = 2.1), dichlorvos + DDT (1.5), PCP + fenitrothion (1.5), PCP + DDT (1.6), PCP + lindane (1.6), Hinosan + fenitrothion (1.6), Hinosan + malathion (1.6), tetrachloroisophthalonitrile + malathion (1.9), tetrachloroisophthalonitrile + dichlorvos (1.7), and propineb + malathion (1.6). Those which showed antagonism were parathion + malathion (0.3), EPN + DDT (0.4), DDT + lindane (0.3), and Hinosan + dichlorvos (0.2). All other pairs, including Blasticidin-S in all combinations, showed additive effects. The mechanisms of synergism and antagonism between pairs of pesticides were discussed.

74-1151. Wildish, D. J.; Lister, N. A. (Fisheries Res. Board of Canada, Biol. Sta., St. Andrews, Canada). **Biological effects of fenitrothion in the diet of brook trout.** *Bull. Environ. Contam. Toxicol. 10(6): 333-339; 1973.* (8 references)

Technical fenitrothion in acetone solution was added to gelatin capsules containing dry fish food and offered to yearling trout to determine the regurgitation threshold of fenitrothion in the diet, spontaneous food partitioning by individual fish, and the effects of the pesticide on weight and brain acetylcholinesterase activity. The threshold for tolerance of fenitrothion in the stomach of the brook trout was 376 mg fenitrothion/kg of wet fish weight; regurgitation occurred 3 to 24 hr after ingestion of fenitrothion. After 4 weeks of feeding 10 mg fenitrothion/g food, the dominance hierarchies, as determined by the percentage of the available food consumed by the individual fish, had reversed within tanks containing 5 or 10 fish; no such effect was observed at fenitrothion concentrations of 1 mg/g food. Although growth was reduced in the fish by ration reduction, the food partitioned by subdominant fish previously not feeding was utilized for growth. Following cessation of the fenitrothion treatment, the previously dominant fish regained dominance, indicating that the fenitrothion-induced changes were not persistent. Twenty-seven days after exposure to 10 mg fenitrothion/g food, the AChE activities of the fish had increased from 17% to 56% of those of the controls. At 1 mg fenitrothion/g food, the depression of AChE activity (38% that of controls) was not associated with behavioral changes. The data indicates that aquatic and terrestrial insects killed by operational spray doses of fenitrothion are unlikely to cause lethal or sublethal effects directly in salmonids.

74-1152. Sanborn, J. R.; Yu, C. C. (Illinois Natural History Survey, Urbana, IL 61801). **The fate of dieldrin in a model ecosystem.** *Bull. Environ. Contam. Toxicol. 10(6): 340-346; 1973.* (2 references)

The model ecosystem described by Metcalf et al. (1971) was used to determine the accumulation, metabolism, and degradation of ^{14}C dieldrin. In addition to the standard components of the Metcalf model ecosystem, one crab, two small fingernail clams, and a water plant were added. Dieldrin (7.905 mg) was added as an acetone solution to each of two ecosystems. After 34 days, 97% of the radioactivity extracted from the organisms was unchanged dieldrin: only 9% of the radioactivity contained in the organisms was unextractable. The fish at the top of the food chain in each ecosystem concentrated dieldrin to the extent of about 6,000 times the concentration in the water; the *Physa* snails, which are not in the food chain of the fish, concentrated dieldrin to the extent of about 115,000 times the concentration in the water. Over the experimental period, the amount of radioactivity in the water decreased from about 0.027 ppm to about 0.0074 ppm. After 34 days, dieldrin constituted about 25 to 28% of the radioactivity in the water; its concentration in the water was considerably less than in the organisms. In addition, the metabolites and degradation products of dieldrin found in the water differed significantly from those found in the organisms. The data indicates that dieldrin is an undesirable pesticide for widespread generalized use in agricultural and public health entomology.

74-1153. Hodkinson, M.; Dalton, S. A. (Sch. of Biol., City of Leicester Polytechnic, Leicester, England). **Interactions between DDT and river fungi. II. Influence of culture conditions on the compatibility of fungi and *p,p'*-DDT.** *Bull. Environ. Contam. Toxicol. 10(6): 356-359; 1973.* (9 references)

A variety of aquatic phycomycetes, aquatic hyphomycetes, and terrestrial hyphomycetes were cultured in basal medium or basal medium containing *p,p'*-DDT and incubated at 5° or 20°C for 24 to 1600 hours. In general, the growth rates of the twelve fungal species were enhanced when DDT was included in the basal medium. However, in most cases, DDT concentrations of 10 μ/ml or higher were required to induce marked changes in fungal growth within 2 to 4 days at 20°C. Incubation temperature affected the growth rates of the fungi but did not alter their responses to the insecticide. Fungi were also cultured in yeast extract, mineral salts,

and distilled water; DDT added to these media enhanced fungal growth in a similar fashion in each case. Thus, the nutritional status of the environment in which fungus and DDT interact governs the extent to which the insecticide affects growth.

74-1154. Pearson, J. E.; Tinsley, K.; Hernandez, T. (Dept. Pharmacol., Louisiana State Univ., Med. Cent., New Orleans, LA 70112). **Distribution of dieldrin in the turtle.** *Bull. Environ. Contam. Toxicol. 10(6): 360-364; 1973.* (12 references)

The concentration of dieldrin in the liver, kidney, muscle, brain, fat, and plasma was determined at various intervals following i.p. injection of 20 mg/kg of the pesticide into turtles weighing 300 gm to 1 kg. The rate of absorption of dieldrin in the turtle was slow and unpredictable, the results at any given time being highly variable. The fat samples showed the greatest ability to concentrate the pesticide, with the liver showing the next greatest ability. The kidney showed only a slight tendency to concentrate the compound, with the brain showing less, and the plasma showing virtually none. The muscle tissue tended to concentrate dieldrin immediately after injection, after which this tendency sharply decreased; within a few days, the percentage of pesticide in the muscle tissue equaled that in the plasma. High concentrations of pesticide in the fat (0.1%) may be partially explained by the fact that the turtles were fasted postinjection.

74-1155. Payne, N. B.; Herzberg, G. R.; Howland, J. L. (Dept. Biol., Bowdoin Coll., Brunswick, ME 04011). **Influence of some insecticides on the ATPase of mouse liver mitochondria.** *Bull. Environ. Contam. Toxicol. 10(6): 365-367; 1973.* (7 references)

The effects of small amounts of aldrin, allethrin, and DDT on the ATPase activity of isolated mouse liver mitochondria were studied. All three insecticides substantially stimulated the mitochondrial ATPase activity, the stimulation resembling that induced by 2,4-dinitrophenol (DNP), but not as marked. None of the insecticides prevented DNP-induced stimulation, a property which distinguishes them from certain other uncoupling compounds such as the alkyl hydroxynaphthoquinones. The stimulation of ATPase by the insecticides was unaffected by altering the ionic content of the test medium or lowering the temperature from 20° to 37°C. The data indicates that aldrin, allethrin, and DDT act on mitochondrial ATPase in a manner similar to that of the uncouplers of oxidative phosphorylation. Such uncoupling would be expected to contribute to the toxicity of these compounds.

74-1156. Sokolik, I. Yu. (Inst. Exp. Med. USSR Acad. Med. Sci., Dept. Embryol., Leningrad, USSR). **Vliyaniye 2,4,5-trikhlorfenoksiuksusnoy kisloty i yeye butilovogo efira na embriogenez krys. [The effect of 2,4,5-trichlorophenoxyacetic acid and its butyl ester on rat embryogenesis.]** *Byull. Eksp. Biol. Med. 76(7): 90-93; 1973.* (7 references) (Russian)

To study effects on embryogenesis 2,4,5-trichlorophenoxyacetic acid and its butyl ester were administered to albino rats at single doses of 50 and 200 mg/kg and 100 and 400 mg/kg through gastric tube between the first and 16th day of pregnancy. 2,4,5-Trichlorophenoxyacetic acid administered at 100 mg/kg resulted in little embryonal lethality. A dose of 400 mg/kg caused high embryonal mortality. Fifty mg of 2,4,5-trichlorophenoxyacetic acid butyl ester caused high embryonal lethality. Both agents proved to be highly specific teratogens, causing cleft palate, hydronephrosis, brachydactylia, gastrointestinal hemorrhages, exophthalmia, syndactyly, and hydrocephalus. 2,4,5-Trichlorophenoxyacetic acid had less powerful embryotoxic and teratogenic properties than its butyl ester. The teratogenic action of these substances is presumed to be due to the presence of dioxin.

74-1157. Wallace, R. R.; West, A. S.; Downe, A. E. R.; Hynes, H. B. N. (Dept. Biol., Univ. Waterloo, Waterloo, Ontario, Canada). **The effects of experimental blackfly (*Diptera: Simuliidae*) larviciding with abate, Dursban, and methoxychlor on stream invertebrates.** *Can. Entomol. 105(6): 817-831; 1973.* (42 references)

Cone, rock, Surber, and drift samples were employed to evaluate the effects of abate, Dursban (chlorpyrifos), methoxychlor and their diluents on blackfly larvae and on 'non-target' stream invertebrates. Post-treatment cone and rock samples often indicated that blackfly larvae were greatly reduced or eradicated from the streams. Blackfly larvae were just as often found, however, in Surber samples. Insecticide diluents, H.A.N. and fuel oil, caused detachment of larvae from cones, but less than when insecticide was added. Although post-treatment samples indicated that 'non-target' organisms were not eradicated from streams, the heavy drift is indicative of considerable disturbance to the aquatic invertebrate community. The catch of invertebrate drift was possibly altered by pools, delaying the drifters in treated streams. However, most of those found in post-treatment drifting nets were dead.

74-1158. Hughes, A. F.; Corke, C. T. (Res. Lab. of Food and Drug Directorate, Dept. Nat. Health and Welfare, Ottawa, Ontario, Canada). **Formation of tetrachloroazobenzene in some Canadian soils treated with propanil and 3,4-dichloroaniline.** *Can. J. Microbiol. 20(1): 35-39; 1974.* (16 references)

The formation of 3,3′,4,4′-tetrachloroazobenzene from the herbicide propanil and from 3,4-dichloroaniline was studied in nine soils which varied in pH, percentage of organic matter, clay, and sand. Marked differences were observed in these soils in the amounts of azoben-

zene formed. In five soils whose pH values fell within a range of pH 4.5 to 5.5, azobenzene was produced from both substrates, while in two soils (Guelph loam and Wendigo loamy sand), azobenzene was only detected from 3,4-dichloroaniline. No azobenzene was detected from either substrate in two additional soils, (Belleisle marsh soil (site 22, pH 3.4) and Biz silt loam (pH 6.4). Air-drying soils, as well as extended periods of storage of freshly collected soils at 4°C, reduced the formation of azobenzene. (Author abstract by permission)

74-1159. Gribble, G. W. (Dartmouth Coll., Hanover, NH 03755). **TCDD: a deadly molecule.** *Chemistry 47(2): 15-18; 1974.* (13 references)

2,3,7,8-Tetrachlorodibenzo-*p*-dioxin (TCDD) is a chemically stable, water-insoluble white solid which melts at 300°C and begins to thermally decompose at 700°C. It is formed when pure 2,4,5-trichlorophenate is heated to 350-400°C. Other chlorinated dibenzo-*p*-dioxins (e.g., octachlorodibenzo-*p*-dioxin and 1,2,3,7,8,9-hexachlorodibenzo-*p*-dioxin) can be formed in thermal reactions involving chlorinated phenols. TCDD is acnegenic, teratogenic, and lethally toxic, especially to guinea pigs. In laboratory animals it concentrates mainly in the liver, brain, and fatty tissues. Its oral administration to laboratory animals causes edema and hemorrhaging in the subcutaneous tissues, intestine, and brain ventricles, and general liver injury; death occurs 1-7 weeks after administration. Application of TCDD to the skin of laboratory rabbits and man causes chloracne, a severe skin disease. The biological activity of TCDD is almost unique to its particular arrangement of halogens; other chlorinated dibenzo-*p*-dioxins are much less active or inactive. In soil TCDD is not readily degraded, bio- or photosynthesized from 2,4,5-trichlorophenol, absorbed into plants, or mobile in the soil. Of 129 samples of 17 pesticides prepared from polychlorophenols and 20 samples of polychlorophenols, 76% contained from no TCDD to less than 0.1 ppm; only 9% contained more than 10 ppm TCDD. Research is needed to determine the effects of TCDD and related compounds on human health.

74-1160. Lingens, F. (Univ. Hohenheim, Inst. fuer Mikrobiol. und Molekularbiol., Stuttgart, Germany). **Abbau von Herbiziden und Fungiziden durch Mikroorganismen des Bodens. [Breakdown of herbicides and fungicides by soil microorganisms.]** *Chimia 27(12): 628-635; 1973.* (47 references) (German)

Studies on the biochemical mechanism of the breakdown of herbicides and fungicides by soil microorganisms are reviewed. Pyrazon, the active agent of pyramine, is metabolized by soil microorganisms into 2-pyrone-6-carboxylic acid through intermediates such as a pyrocatechol derivative and 5-amino-4-chloro-2-(2,3-*cis*-dihydroxycyclohexa-4, 6-diene-1-yl)-3(2H)-pyridazinone. Phenoxyacetic acids are first decomposed by soil microorganisms by removal of the aliphatic side chain, after which the phenol thus formed is converted into a pyrocatechol derivative. Gradual substitution of the nitro groups, liberation of nitrites, and metabolism into a trihydroxy compound was observed during the breakdown of 3,5-dinitro-*o*-cresol (DNOC) by *Arthrobacter simplex*. Dealkylation and reduction of trifluralin by *Bacteroides ruminicola* ssp. brevis and *Lachnospira multiparus* was evidenced. Removal of the side chain, release of carbon monoxide, hydrolysis, and nitrogen dealkylation of *s*-triazines in the soil were observed. Linuron is believed to be decomposed into 3,4-dichloroaniline, methoxymethylamine, and carbon dioxide in the soil. Slow breakdown of *o*-toluanilide and 2,5-dimethylfuran-3-carboxanilide by *Nocardia* spp. in the soil was observed.

74-1161. Cheymol, J.; Chabrier, P.; Thuong, N. T.; Thizy, A.; Demozay, D.; Pillon, D. (Faculte de Medecine, Institut de Pharmacologie, Paris, France). **Toxicites comparees (Mammiferes, Insectes, Acariens) de nouveaux derives trisubstitues de l'acide thiophosphorique. [Comparative toxicities (mammals, insects, acarians) of new trisubstituted thiophosphoric acid derivatives.]** *C. R. Acad. Sci. Paris Ser. D. 277(20): 2277-2279; 1973.* (2 references) (French)

The toxicity of trisubstituted thiophosphoric acid derivatives with alkoxy and/or thioalkyl radicals in albino mice, *Sitophilus granarius, Musca domestica, Blatella germanica, Anagasta kuhniella,* and *Tetranychus urticae* was studied in relation to the chemical structure of the different substances. One compound had rather low toxicity in mice (LD50 of 230 mg/kg of body weight by i.p. injection), while it had polyvalent, high toxicity in insects. Another derivative had an LD50 of 51 mg/kg in mice, but it was 5 to 100 times less toxic to insects than the first compound.

74-1162. Prigge, E. (Tieraerztliche Hochschule Hannover, Inst. fuer Pharmakol., Toxikol. und Pharmazie, Hanover, Germany). **Umwelttoxikologische Aspekte der Anwendung von Insektiziden und Herbiziden. [Environmental and toxicological aspects of the application of insecticides and herbicides.]** *Deut. Tieraerztl. Wochenschr. 80(20): 485-488; 1973.* (German)

General environmental and toxicological aspects of herbicides and insecticides, and especially of organochlorine, organophosphorus, and carbamate pesticides are surveyed. The physicochemical properties, residue analytical data, data on the acute, subacute, and chronic toxicity, and special data on possible carcinogenic and teratologic effects are required for the homologation of new pesticides. The toxicity data obtained in animal tests is adapted to human toxicology by the use of safety factors. The tolerances established for DDT, methoxychlor, lindane, aldrin, dieldrin, toxaphene, endosulfan, carbaryl, diazinon, dimethoate, phencapton,

azinphos, mevinphos, and trichlorfon are 1, 2-100, 2, 0-0.25, 0.1, 7, 10, 1, 0.5-2, 1, 0.5-2, 0.25-1, and 1 ppm, respectively. Organochlorine pesticides are extremely persistent and stable, and most of them are not degraded by microorganisms. Lindane, aldrin, and dieldrin are taken up by roots, DDT and endosulfan are not. Unlike all other organochlorine pesticides, endosulfan is degraded by plant enzymes to nontoxic metabolites. Organophosphorus pesticides are highly toxic due to their inhibitory action on the cholinesterase activity. They are decomposed mainly through hydrolysis or oxidation. Phosphoric acid esters are enzymatically degraded in 7 to 14 days. The mechanism of the toxic action of carbamates is similar to that of organophosphates.

74-1163. Komarovskiy, F. Ya. (Inst. Hydrobiol. Acad. Sci. USSR, Kiev, USSR). **Vozniknoveniye metgemoglobinemii u ryb pod vliyaniyem nekotorykh gerbitsidov. [Emergence of methemoglobinemia in fish under the effect of some herbicides.]** *Eksp. Vod. Toksikol. 4: 31-37; 1973.* (19 references) (Russian)

The emergence of methemoglobinemia and hematological changes produced by 0.5-10 mg/l. concentrations of diuron in roach and ide were studied in aquaria and field tests. Methemoglobinemia rapidly developed during the first hours of exposure to diuron. The methemoglobinemia reached 16% in 24 to 48 hr in fish kept in water with 5-10 mg of diuron per liter. The methemoglobinemia reached its maximum somewhat later at diuron concentrations of 0.5-1 mg/liter. The methemoglobinemia is most probably due to the reduced active hemoglobin level (3 g% against a control value of 6-8 g%). Hematological investigations revealed profound pathologic changes of the blood picture (destruction of blood elements, emergence of pathologic forms of erythrocytes and leucocytes, pronounced vacuolization of the cytoplasm and karyoplasm, deformation and lysis of the nuclei of erythrocytes, irreversible changes in the cytoplasm and karyoplasm, and considerable reduction of the hematocrit index).

74-1164. Popova, G. V. (Cent. Lab. Nat. Conserv., Moscow, USSR). **Izmeneniye morfofiziologicheskikh pokazateley ryb pod vliyaniyem propanida. [Change in the morphophysiological indices of some fish caused by stam F-34.]** *Eksp. Vod. Toksikol. 4: 38-49; 1973.* (15 references) (Russian)

The effects of stam F-34 (propanil) on some morphophysiological indices in roach and ide were studied in acute poisoning tests in aquaria, and in chronic poisoning tests in the field. The acute poisoning tests established the LD50 of stam F-34 at 2.5 mg/l. Areflexia, motor coordination troubles, tachypnea, and respiratory failure and death were observed. Chronic, 60-day experiments under field conditions were conducted using stam F-34 at an expenditure of 7 kg/ha. No residues of stam F-34 or its metabolites from the 20th day on were detected in the water. The metabolite concentration was highest on the 10th day of the experiment. Qualitative and quantitative changes in the blood (increase in the hemoglobin level, elevated erythrocyte count due to pathologic polychromatophilia, amitotic division of the erythrocytes, anucleosis, intense hemolysis); reduced length and weight growth due to reduced rates of metabolism; reduction in the absolute weight of the body, liver, spleen and brain; increased relative weight of the brain; and decreased relative weight of the spleen and liver were observed. The above changes were most pronounced on the 10th day of the experiment and failed to normalize by the 60th day. Pathologic changes of the reproductive system and of the ovocytes in particular in sexually immature fish were noted.

74-1165. Shcherbakov, Yu. A.; Lizina, N. N.; Chemova, N. G. (Saratov Branch of GosNIORKh, Saratov, USSR). **Izucheniye vliyaniya butilovogo efira 2,4-D na ryb. (Gistologicheskoye i gistokhimicheskoye issledovaniye). [Effect of butyl ester of 2,4-D on fish (histologic and histochemical investigations).]** *Eksp. Vod. Toksikol. 4: 50-55; 1973.* (4 references) (Russian)

The effect of 2,4-D butyl ester in water at 0.006 to 5 mg/liter was studied in acute, subacute, and chronic exposure tests on carp through histochemical and histological investigations. Dilation and plethora of the capillaries and larger vessels, necrosis with fatty degeneration of the liver, dystrophy and desquamation of the canalicular epithelium, pericellular and perivascular edema of the brain and edema of the meninges, hyperemia of the myocardium, and focal hyperplasia of the spleen were determined by histological investigations. Histochemical examinations revealed greatly reduced glycogen levels in liver and kidney and similarly reduced DNA levels in liver, kidney, intestines, and brain. The histological and histochemical changes were most pronounced at the highest 2,4-D butyl ester concentrations.

74-1166. Zhiteneva, L. D.; Chesnokova, T. V. (Krasnodar Sci. Res. Inst. Piscicult., Krasnodar, USSR). **Izmeneniye morfologicheskogo sostava krovi lichinok belogo amura pod vliyaniyem gerbitsidov. [Changes in the morphological structure of the blood of *Ctenopharyngodon idella* larva under the effect of herbicides.]** *Eksp. Vod. Toksikol. 4: 56-68; 1973.* (17 references) (Russian)

The effect of 4-7 kg/ha (water surface) doses of propanil and 1.8-5 kg/ha doses of 2,4-D on the morphological structure of the blood in *Ctenopharyngodon idella* larvae was studied. Changes in the ratio of erythrocytes to leukocytes due to intensified erythropoiesis, increases in the number of mature erythrocytes, decreases in the percentage of lymphocytes, and increases in the number of polymorphous cells and monocytes were observed. The thrombocyte count

increased in many cases. Degradation and destruction of the erythrocytes and leukocytes was the result of toxicosis. Edema of the erythrocytes, pyknotization of the erythrocyte nuclei, and loss of cytoplasm were found. Non-edematous erythrocytes assumed a giant, angular shape.

74-1167. Shcherban', E. P. (Inst. Hydrobiol. Acad. Sci. USSR, Kiev, USSR). **Vliyaniye atrazina na biologicheskiye parametry i potentsial'nuyu produktivnost' *Daphnia magna* i *Moina rectirostris*. [Effect of atrazine on biological parameters and potential productivity of *Daphnia magna* and *Moina rectirostris*.]** *Eksp. Vod. Toksikol. 4: 80-86; 1973.* (9 references) (Russian)

The effects of 1 mg of atrazine per liter of water on biological parameters and potential productivity of *Daphnia magna* and *Moina rectirostris* were studied in a 30-45-day experiment. The potential productivity of *D. magna* and *M. rectirostris* decreased by 8.6 to 13.3% of the corresponding control values, while the embryonal and larval mortality amounted to 66.6% and 20%, respectively. The reduction of the actual productivity was mainly due to the reduced reproductive activity. *Moina rectirostris* was more susceptible to the effect of atrazine than *D. magna*. An increase in the duration of the embryonal and postembryonal development of both species was observed.

74-1168. Burtnaya, I. L. (Inst. Hydrobiol., Acad. Sci. USSR, Kiev, USSR). **Izmeneniya kaloriynosti i soderzhaniya organicheskogo veshchestva u mollyuskov *Radix ovata* Drap. pri khronicheskom vozdeystivii gamma-izomera geksakhlorana. [Changes in the caloricity and the organic matter content in molluscs, *Radix ovata* Drap., under chronic effect of lindane.]** *Eksp. Vod. Toksikol. 4: 87-90; 1973.* (5 references) (Russian)

The effect of lindane at 0.2 and 0.02 mg/l. on the caloric value of the dry matter and on the organic matter content in *Radix ovata* Drap. was studied. The caloric value of the dry matter in molluscs exposed to 0.2 mg/l. of lindane amounted to 66-73% of the corresponding control value, while the corresponding decrease in the caloric value of the dry matter in molluscs exposed to 0.02 mg/liter ranged from 22 to 23%. The organic matter content in molluscs exposed to 0.2 and 0.02 mg/liter concentrations of lindane decreased to 70-79% and to 84-89% of the control values, respectively. The decrease in the caloric value was thus due to a loss of organic matter rather than to changes in the unit caloric value. The findings indicate that determination of the caloric value and organic matter content in the body of hydrobionts in a chronic experiment is useful for evaluating the toxic effect of pesticides.

74-1169. Cooke, A. S. (Monks Wood Experimental Station, Abbots Ripton, Huntingdon, England). **The effects of DDT, when used as a mosquito larvicide, on tadpoles of the frog.** *Environ. Pollut. 5(4): 259-273; 1973.* (18 references)

A decline in toad and frog populations on the Isle of Grain has been recently noted, and studies were carried out to determine what effect mosquito control operations which utilize DDT had on these animals. Tadpoles were housed in nylon mesh cages in various bodies of water and DDT was applied at a rate of 0.4-0.5 kg/ha to 2 m strip around the edge of the pond or ditch. DDT was detectable in the water at most sites on day 1, but not on days 3 or 14 after spraying. Highest residues/tadpole were found in a small ditch 1 m wide, and no tadpoles survived for 14 days at this site. Behavioral and morphological abnormalities were noted in all sites where DDT was detectable in the water. Mortality was observed among free-living fish in the sites on day 2.

74-1170. Haney, A.; Lipsey, R. L. (Dept. Botany, Univ. Illinois, Urbana, IL 61801). **Accumulation and effects of methyl mercury hydroxide in a terrestrial food chain under laboratory conditions.** *Environ. Pollut. 5(4): 305-316; 1973.* (12 references)

Tomato roots and terminal foliage concentrated mercury 1367 and 250 times respectively from nutrient solutions containing methyl mercury hydroxide in two days, at which time peak levels were reached. The peak mercury level in aphids placed on the plants during the experiment occurred on day 4 and was 1670 times that in the treatment solution. In the predator lacewing larvae, peak concentration of 4178 times was observed on days 6 or 8. Although levels tended to show a steady decline after peaks were reached, the effects of accumulated mercury tended to increase.

74-1171. Datta, K. K.; Dikshith, T. S. S. (Industrial Toxicol. Res. Cent., Lucknow, India). **Histopathologic changes in the testes and liver of rats repeatedly exposed to pesticides.** *Exp. Pathol. 8(5-6): 363-370; 1973.* (19 references)

Adult male ITRC rats were given triweekly i.p. injections of ethyl parathion or methyl parathion plus DDT over a period of 90 days; a control group was given i.p. injections of saline. Although none of the experimental animals showed any clinical symptoms of pesticide poisoning throughout the study, the pesticide treatments produced pathological lesions in the liver and testes. Degenerative changes in the seminiferous tubules of the testes included edema, the presence of multinucleate giant cells, and interstitial enlargement. Hepatic changes included congestion of the blood vessels and parenchyma; sinusoidal congestion and dilation; hypertrophy and pyknosis of the hepatocytes; cellular vacuolation and foamy appearance of the cytoplasm, and karyorrhexis, karyolysis, and pyknosis of the hepatocytes. Inflammation of the bile duct epithelium and

irregular necrosis persisted throughout the treatment period. As compared with the effects of a single exposure to pesticides, prolonged exposure increased the extent of liver damage.

74-1172. Thier, W. G.; Gorbach, S. G.; Fischer, H. (Farbwerke Hoechst AG, Anal. Lab., Frankfurt a.M.-Hoechst, Germany). **Modellversuche zur Verteilung und zum Metabolismus von Triazophos in und auf Baumwollpflanzen unter verschiedenen Versuchsbedingungen. [Experiments on the distribution and metabolism of triazophos in and on cotton plants under different conditions.]** *Fresenius Z. Anal. Chem. 267(3): 181-186; 1973.* (2 references) (German)

The distribution, metabolism, and uptake of ^{14}C-labeled triazophos were studied in greenhouse and field tests. The experiments demonstrated longer activity of triazophos in the greenhouse than in the field. In greenhouse experiments the triazophos residue present on the leaf surface fell to 4% of the initial level in 4 weeks. This residue was composed primarily of intact triazophos. The P=O analog of triazophos was present temporarily. Relatively rapid uptake of triazophos into the leaves without translocation to other plant parts was noted. Sprouts contained practically no triazophos residues. Cotton staples contained 0.025% of the intially applied quantity 15 weeks after treatment. This residue was composed of intact triazophos (0.02 ppm), 1-phenyl-3-hydroxy-1,2,4-triazole (0.01 ppm), and an unidentified metabolite (0.01 ppm). Cotton seeds contained 0.3 ppm triazophos and 0.1 ppm 1-phenyl-3-hydroxy-1,2,4-triazole. Low triazophos and metabolite levels were detected in the field tests. Both cotton staples and seeds contained about 0.1 ppm of intact triazophos and 0.1 ppm of 1-phenyl-3-hydroxy-1,2,4-triazole. A small quantity of the unidentified metabolite was also detected. The latter and 1-phenyl-3-hydroxy-1,2,4-triazole were found not to be cholinesterase inhibitors. The unidentified metabolite is presumed to be a demethylated derivative of triazophos. In moist ground the cotton plant root absorbed much less triazophos than in culture solution, the ratio being 1:15.

74-1173. Muirhead-Thomson, R. C. (Blair Res. Lab., Min. Health, P.O. Box 8105, Causeway, Salisbury, Rhodesia). **Laboratory evaluation of pesticide impact on stream invertebrates.** *Freshwater Biol. 3(5): 479-498; 1973.* (21 references)

The laboratory techniques for examining the reaction of various stream invertebrates to known time/concentration combinations of pesticides under conditions of water flow and continuous circulation and replacement are described. Initial comparison between reactions of various species to pesticides employed a one hour exposure to serial dilutions followed by a holding period of 24 hours in clean water. Effects of DDT on prey organisms such as *Baetis* naiads and *Simulium* larvae differ strikingly from those on predator invertebrates such as dragonfly naiads and *Nepa*. Near 100% mortality rates were produced in the prey organisms by concentrations as low as 0.05 ppm for one hour, while many dragonfly naiads could survive exposures of up to 200 ppm for one hour and live to adulthood. Effects of Lebaycid (fenthion) differed markedly in that they were nearly uniform on dragonfly naiads, *Baetis* naiads, and *Simulium* larvae. Dragonfly naiads were even more susceptible to fenthion than net-spinning larvae of the caddis fly, *Hydropsyche*. Other organophosphorus pesticides and the carbamate, propoxur, showed varying degrees of this differential effect. Only Lebaycid had a uniform impact. When concentration X period of exposure was constant, dragonfly naids were more tolerant to long exposures at lower concentrations than to shorter exposures at higher concentrations. Implications of the findings on the predator/prey relationship in freshwater ecosystems are discussed.

74-1174. Hanada, M.; Yutani, C.; Miyaji, T. (1st Dept. Pathol., Osaka Univ. Sch. Med., Osaka, Japan). **Induction of hepatoma in mice by benzene hexachloride.** *Gann 64(5): 511-513; 1973.* (5 references)

Male and female dd mice were maintained on diets containing 100, 300, or 600 ppm benzene hexachloride (BHC) or its α-, β-, or γ isomers. An experimental laparotomy on the 26th week indicated a high incidence of liver tumors among the male animals fed 600 ppm BHC or 300 or 600 ppm of the α or γ-isomers; none of the animals fed the β-isomer had developed tumors. The incidence of liver tumors among the female mice was greatly reduced, occurring in only 1 out of 27 laparotomized animals. By the 37th week, liver tumors had been induced in 26 of the remaining 34 males (76.5%) and in 17 of the remaining 39 females (43.5%); again, no tumors were found in the animals fed the β-isomer. Mammary tumors were found in a small number of the females treated with 660 ppm of the α isomer and 300 ppm of the β-isomer. In addition to hepatoma, foci of enlarged liver cells with nuclear irregularities were scattered in the hepatic lobules of many of the experimental animals. Similar lesions were found in the absence of hepatoma in some of the animals treated with 300 or 600 ppm β-BHC. Alpha-fetoprotein was not detected in the sera of the animals with hepatoma.

74-1175. Bringmann, G. (Bundesgesundheitsamt, Institut fuer Wasser-, Boden- und Lufthygiene, Berlin-Dahlem, Germany). **Bestimmung der biologischen Schadwirkung wassergefaehrdender Stoffe aus der Hemmung der Glucose-Assimilation des Bakterium *Pseudomonas fluorescens*. [Determination of the biological effect of water-polluting substances by the impairment of glucose assimilation by the bacterium *Pseudomonas fluorescens*.]** *Gesundh.-Ing. 94(12): 366-369; 1973.* (6 references) (German)

The possibility for determining the detrimental biological effects of various water-polluting substances via inhibition of glucose assimilation by *Pseudomonas fluorescens* was studied under laboratory conditions. The highest non-toxic concentration and the lowest toxic concentration of the water polluting substances were determined from the gravimetric turbidity equivalent of the bacterial suspension. Following incubation of the test cultures at 25°C, the pollutant, dissolved in distilled water, was added and the pH adjusted to 7 by adding hydrochloric acid or sodium hydroxide. The minimum concentrations causing inhibition of glucose assimilation by *Pseudomonas fluorescens* were 0.03 mg/l. for copper sulfate, 4 mg/l. for *p*-nitrophenol, and 16 mg/l. for DNOC.

74-1176. Lukaneva, A. M.; Rodionov, G. A. (All-Union Sci. Res. Inst. Hyg. Toxicol. Pesticides, Polymers, Plastic Materials, Kiev, USSR). **Nekotoryye eksperimental'nyye dannyye o vliyanii DDT i sevina na razvitiye kholesterinovogo ateroskleroza. [Certain experimental data on the effect of DDT and sevin on the development of cholesterol atherosclerosis.]** *Gig. Sanit. 38(9): 41-45; 1973.* (2 references) (Russian)

The effect of DDT and carbaryl on the development of cholesterol-induced atherosclerosis was studied anatomically and histochemically in rabbits that were given 0.2 mg/kg cholesterol per day together with 25 mg of DDT or 40 mg of carbaryl per kg body weight. Changes in the lipid metabolism were observed in the form of considerably increased cholesterol, lecithin, and beta-lipoprotein levels. These changes were more pronounced in groups fed cholesterol together with DDT or carbaryl than in groups fed cholesterol only. A tendency toward increased heart rate, prolongation of the isometric phase of contraction and the stimulus buildup period, and extensive atherosclerotic areas in the aorta and the coronary artery were observed. The findings indicate a potentiating effect of DDT and carbaryl in cholesterol-induced experimental atherosclerosis.

74-1177. Pyatnitskaya, L. V.; Volodchenko, V. A.; Vasilenko, N. M.; Manfanovskiy, V. V.; Prilipskiy, Yu. V. (Sci. Res. Inst. Ind. Hyg. Occup. Dis., Kharkov, USSR). **Materialy k obosnovaniyu predel'no dopustimoy kontsentratsii beta-naftola v vozdukhe proizvodstvennykh pomeshcheniy. [Data for substantiating the maximum permissible concentration of beta-naphthol in the air of industrial premises.]** *Gig. Sanit. 38(10): 15-18; 1973.* (3 references) (Russian)

The subacute and chronic toxicity of beta-naphthol was studied on rats to establish the maximum allowable concentration of this substance in the air of industrial premises. Following oral or inhalation administration of 30 doses of 1/15 LD50, reticulocytosis, increased weight ratio of the heart, reduction of the serum SH-group level, increased beta-globulin level, creatinuria, proteinuria, and increased residual nitrogen level in the blood were observed. The minimum toxic concentration in inhalatory tests was 0.10 mg/m^3. Slight skin absorption of beta-naphthol was determined. Although a polymorphous-cell sarcoma was observed following s.c. introduction of beta-naphthol, this substance can not be regarded even as a weak chemical carcinogen. Exposure of rats to 10.1±0.59 mg/m^3 in air for 4 months produced changes similar to those observed in the subacute tests, but exposure to 1.35 mg/m^3 caused only temporary changes in weight gain and in the peripheral blood smear (reduced hemoglobin, erythrocyte, and leucocyte levels.) Exposure to 0.45 mg/m^3 caused a temporary reduction in the urinary excretion of nitrogen compounds. The latter concentration is regarded as the minimum toxic one in chronic poisoning. It is recommended that the maximum allowable concentration of beta-naphthol in the air of industrial premises be set at 0.10 mg/m^3.

74-1178. Vashakidze, V. I.; Mandzhgaladze, R. N.; Zhorzholiani, V. S. (Ministry of Public Health of the Georgian SSR, Sci. Res. Inst. Ind. Hyg. Occup. Dis., Tbilisi, USSR). **O toksichnosti kaptana e yego gigiyenicheskom normirovanii v produktakh pitaniya. [The toxicity of captan and its hygienic standardization in food products.]** *Gig. Sanit. 38(10): 24-27; 1973.* (Russian)

The acute and chronic toxicity of captan was studied in albino rats, mice, and rabbits with the objective of hygienic standardization of captan residues in food products. The LD50 was 138 mg/kg in mice, 2,650 mg/kg in rats, and 740 mg/kg in rabbits. The minimum lethal dose in mice and rats was 25 mg/kg and 1,000 mg/kg, respectively. Subacute and chronic poisoning resulted in retarded weight gain, hypochromic anemia, leukopenia, increased fetal hemoglobin level in the blood, reduced serum cholinesterase activity, and increased aspartate and alanine transaminase levels in the blood. Further signs were reduction in the blood cholesterol and the urinary hippuric acid levels, significant decrease in the motility period of spermatozoa, prolongation of the estrous cycle, and shortening of the estrous phases. Rat embryos were most susceptible to captan during organogenesis, while mouse embryos were sensitive throughout embryonic development. Reduced viability, retarded sexual maturation, and disturbances in the estrous cycle were observed in the offspring. With a maximum allowable daily intake of 0.5 mg/kg, it is recommended that the maximum allowable concentration of captan in food products be set at 0.35 mg/kg. The last treatments of grapes and apples should be performed 2 and 1 months before harvesting, respectively.

74-1179. Shal'nova, N. D. (F. F. Erisman Moscow Sci. Res. Inst., Moscow, USSR). **Eksperimental'nyye materialy k gigiyenicheskoy otsenke pestitsida tsikosa.**

[Experimental data for hygienic assessment of the pesticide zykos.] *Gig. Sanit. 38(12): 55-58; 1973.* (4 references) (Russian)

Acute and chronic poisoning tests with zykos (zineb plus ziram) were performed on mice, rats, and rabbits for the hygienic assessment of this pesticide. Zykos proved to be of low toxicity, with oral LD50 values of 1,050 mg/kg in mice, 2,250 mg/kg in rats, and 620 mg/kg in rabbits. The cumulation coefficients calculated for 1/10, 1/20, and 1/5 LD50 doses are 2.5, 1.5, and 0.5. In chronic experiments zykos provoked disturbances of redox processes, changes in the status of the central nervous system and in the detoxifying and excretory functions of the liver, and dystrophic lesions of the parenchymatous organs. Chronic poisoning tests in which animals were fed 1/50 of the LD50 per day revealed increased alanine aminotransferase activity in rabbits, decreases in this parameter in rats, fluctuations in the serum ceruloplasmin and SH group levels, changes in cytochrome oxidase activity (increase in rats and decrease in rabbits), reduction of the acetylcholinesterase activity, and significant lowering of the neuromuscular stimulus threshold. The effective, threshold, and subthroeshold doses were determined to be 1/50 LD50, 1/100 LD50, and 1/150 LD50.

74-1180. Kuz'minskaya, U. A.; Girenko, D. B. (All-Union Sci. Res. Inst. Hyg. Toxicol. Pesticides, Polymers, Plastic Materials, Kiev, USSR). **Raspredeleniye i metabolizm DDT v subkletochnykh fraktsiyakh pecheni eksperimental'nykh zhivotnykh i cheloveka. [Distribution and metabolism of DDT in the subcellular fractions of the liver in experimental animals and man.]** *Gig. Sanit. 38(12): 59-62; 1973.* (12 references) (Russian)

The distribution and metabolism of DDT were studied in the nuclear, mitochondrial, and supernatant fractions of the livers of DDT-poisoned albino rats and in liver samples from deceased cardiac patients who had had no occupational contact with DDT. Following administration of 70 mg of DDT per kg of body weight per day to rats for 3 days, DDT and its metabolites (DDE and TDE) were detected in all subcellular fractions of the liver, with highest levels in the nuclear and mitochondrial fractions and lowest levels in the supernatant fractions. A decrease in the absolute quantity of both DDT and its metabolites in all fractions and a relative increase in the DDT and DDT metabolite levels in the supernatant fraction were observed 7 to 14 days after poisoning. The DDT and DDT metabolite levels were highest in the supernatant fraction of the liver in animals fed 3.5 mg/kg of DDT daily for 5 months. In human livers taken from patients who had died of heart attacks, the DDT, TDE, and DDE concentrations were highest in the supernatant fraction of the liver. The primary metabolite of DDT in human liver was DDE, while TDE was predominant among the DDT metabolites in the rat liver. The specific features of the intracellular distribution of DDT and its metabolites may be due to biochemical changes developing in the tissues after short or prolonged contact with DDT.

74-1181. Herrmann, W. P. (Universitaets-Hautklinik, Cologne, Germany). **Skabies. [Scabies.]** *Z. Allgemeinmed. 48(27): 1215-1220; 1972.* (German)

Etiology, pathogenesis, diagnosis, and therapy of scabies are described. Scabies is now effectively controlled by means of BHC in the form of Jacutin emulsion. Before application of the emusion all extraneous preparations, such as ointments, creams, and detergents, should be carefully removed from the patient's skin to prevent excessive absorption of BHC. This is particularly important for infants and children. Jacutin emulsion is rubbed into the patient's skin from head to toe on three successive evenings, left on overnight, and washed off in the morning. All traces of Jacutin must be removed before other medication is applied.

74-1182. Singhal, J. P.; Singh, C. P. (Aligarh Muslim Univ., Aligarh, Uttar Pradesh, India). **Effect of nemagon on some soil properties.** *Indian J. Agr. Sci. 43(3): 280-284; 1973.* (11 references)

In doses from 0 to 2.5 mg/5 kg of soil, nemagon (dibromochloropropane) increased the electrical conductivity of the soil but had no marked effect on the pH or calcium carbonate content. A maximum increase in soil organic matter was observed 45 days after treatment with most doses, and there was no significant difference between doses. Significantly higher available nitrogen was found after 45 days exposure to 1 ml of nemagon/5 kg of soil, but large doses inhibited this parameter. In 30 days a maximum level of available phosphorus was found with an application of 1.5 mg/5 kg of soil. A decrease in available potassium was observed after 45 days in treated soil.

74-1183. Atuahene, S. K. N.; Hooper, G. H. S. (Forest Products Res. Inst., Univ. Box 63, Kumasi, Ghana). **Insecticide susceptibility of, and metabolism of DDT by *Dacus tryoni* (Froggatt) and *Dacus cucumis* French (Diptera: Tephritidae).** *J. Aust. Entomol. Soc. 11(2): 135-142; 1972.* (24 references)

Female flies of *D. cucumis* obtained in a Queensland pawpaw orchard in 1967 and those of *D. tryoni* obtained from the University of New South Wales absorbed ring-labeled *p,p'*-DDT rapidly at first, with penetration half-times of 3.9 and 4.0 hr. As the temperature was increased from 21° to 30° absorption increased, but survival of the flies also increased. Both flies metabolized DDT to DDE, and the conversion was much greater with *D. cucumis*. Excretion of DDT was not affected by temperature, but increasing temperature resulted in increased dechlorinating ability of the tissues.

Toxicological investigation indicated that both strains were susceptible to DDT, TDE, malathion, azinphos-methyl, and carbaryl.

74-1184. Johannsen, F. R.; Knowles, C. O. (Dept. Entomol., Univ. Missouri, Columbia, MO 65201). **Metabolism of fluenethyl acaricide in the mouse, house fly, and two-spotted spider mite.** *J. Econ. Entomol. 67(1): 5-12; 1974.* (23 references)

The metabolic fate of fluenethyl (FlU) or 2-fluoroethyl (4-biphenylyl) acetate was studied in the mouse, the house fly, *Musca domestica* L., and the twospotted spider mite, *Tetranychus urticae* Koch. Excretion balance data indicated that FlU-^{3}H equivalents were eliminated at a moderate rate in mouse urine and feces, following intraperitoneal injection of the acaricide. FlU metabolites identified in mouse urine included biphenylacetic acid 2-hydroxybiphenyl, 4-hydroxybiphenyl, and 4,4′-dihydroxybiphenyl; biphenyl and 3,4-dihydroxybiphenyl were tentatively identified. Biphenylacetic acid and the hydroxylated biphenyls occurred in mouse urine in the free form and as glucuronides and ethereal sulfates. FlU also was degraded enzymatically by subcellular fractions prepared from a mouse liver homogenate, and nonezymatically by a model hydroxylation system. Degradation products were biphenylacetic acid and the hydroxylated biphenyls. Metabolism of FlU-$^{\circ}$H was effected in vivo and in vitro by house flies and two-spotted spider mites. Although quantitative differences were apparent, qualitatively the metabolites were identical to the free compounds isolated from mouse urine, with the exception that 2-hydroxybiphenyl was not detected in spider mites. Plasma from humans, mouse, sheep, and pig also catalyzed the degradation of FlU-^{2}H. Biphenylacetic acid was the major product, and its formation in this and the other in vitro studies was inhibited by DFP (diisopropyl phosphorofluoridate).

74-1185. Khudairi, S. Y. A.; Ruber, E. (Biol. Dept., Northeastern Univ., Boston, MA 02115). **Survival and reproduction of ostracods as affected by pesticides and temperature.** *J. Econ. Entomol. 67(1): 22-24; 1974.* (8 references)

Toxicities of DDT, chlorpyrifos, and fenthion to *Cyprinotus incongruens* Ramdohr and *Chlamydotheca arcuata* Sars were evaluated in laboratory cultures. For the former species, the series from most to least toxic was chlorpyrifos, fenthion, DDT; and for the latter species, it was chlorpyrifos, DDT, and fenthion. Data for 24 hr were inadequate to predict field effects because mortalities in test plates increased each day, even at concentrations where no 24-hr mortalities were recorded. Temperature stress which would be likely to occur in early spring and in later summer (5 and 35°C increased insecticide toxicities at a given concentration; lowest mortalities occurred at intermediate temperatures (15 and 25°C). There is some tendency towards induction of egg-laying in these 2 species by toxic doses of the insecticides; the effect is even more pronounced in *Cypridopsis vidua* O.F. Muller. At all intermediate doses, some fraction of the eggs hatched and matured, which could be a mechanism for reestablishment of populations, but at the highest DDT doses (5.0 ppm) zero eggs hatched. (Author abstract by permission)

74-1186. Walker, W. W.; Stojanovic, B. J. (Dept. Agron.-Soils, Mississippi State Univ., Mississippi State, MS 39762). **Malathion degradation by an *Arthrobacter* species.** *J. Environ. Qual. 3(1): 4-10; 1974.* (13 references)

The dissipation of malathion from agricultural soils has been shown to involve both chemical and biological mechanisms, with biodegradation being of substantial magnitude. This investigation was conducted to isolate from soil by enrichment techniques a bacterium or several bacteria capable of readily metabolizing malathion, and isolate and identify the malathion metabolites resulting from this microbial degradation. Of 18 soil bacteria examined, 5 were capable of utilizing the malathion molecule with degradation of added insecticide ranging from 47 to 95%. The most efficient malathion ultilizer, an *Arthrobacter* species, degraded malathion to malathion half-ester, malathion dicarboxylic acid, potassium dimethyl phosphorothioate, potassium dimethyl phosphorodithioate, and one other unidentified metabolite. *O*-desmethyl malathion, potassium salt, was also produced, but the mechanism involved was nonbiological in nature. Malathion dissipation was monitored by electron-capture gas-liquid chromatography, and metabolites were identified by thin-layer chromatography and infrared spectroscopy. (Author abstract by permission)

74-1187. Dorough, H. W.; Ivie, G. W. (Dept. Entomol., Univ. Kentucky, Lexington, KY 40506). **Fate of mirex-^{14}C during and after a 28-day feeding period to a lactating cow.** *J. Environ. Qual. 3(1): 65-67; 1974.* (12 references)

The use of mirex [1,3,4-methenododecachlorooctahydro-2H-cyclobuta (c.d) pentalene] for the control of the imported fire ant in pasture land is a potential source of contamination of meat and milk of dairy animals. To determine the level and nature of the residues which might occur should the animals consume the insecticide in the diet, mirex-^{14}C was administered via gelatin capsules twice daily to a lactating Jersey cow for 28 days. The daily dose was equivalent to approximately 0.2 ppm mirex in the diet. Radioactive residues in the feces reached a maximum of 50% of the consumed dose after 3 weeks and remained at that level until treatment was terminated. An additional 3% was eliminated in the feces during the 28-day post-treatment period. Mirex-^{14}C equivalents in the milk reached an equilibrium after about 1 week of treatment. Approxi-

mately 10% of the administered doses were eliminated daily by this route with the concentration in the whole milk after equilibration being 0.058 ppm. One week after removing the mirex source, the residues in the milk dropped to 0.006 ppm and then declined gradually to 0.002 ppm after 28 days. Residue levels in the tissues 28 days after the final treatment were: fat, 0.21 ppm; liver, 0.03 ppm; and kidney, 0.02 ppm; the muscle and brain contained no detectable residues. TLC (thin-layer chromatography) and GLC (gas-liquid chromatography) analyses of the milk, feces, and fat demonstrated that unchanged mirex-^{14}C was the only radioactive component of these substrates. (Author abstract by permission)

74-1188. Cofone, L.; Walker, J. D.; Cooney, J. J. (Dept. Biol., Univ. Dayton, Dayton, OH 45469). **Utilization of hydrocarbons by *Cladesporium resinea*.** *J. Gen. Microbiol. 76(Pt. 1): 243-246; 1973.* (13 references)

The fungus *Cladosporium resinae*, which had been isolated from jet fuel systems, grew with a number of hydrocarbons as sole carbon source after a lag period but did not grow on aldrin, dieldrin, DDT, diazinon, malathion, or rotenone. The pesticides did not inhibit growth of *C. resinae* on glucose or hexadecane; at concentrations up to 20,000 ppm aldrin and malathion enhanced growth on hexadecane; aldrin, dieldrin, DDT, and malathion enhanced growth on glucose. Oxygen uptake by the organism was not affected by the pesticides. *C. resinae* has been isolated from soil and air samples over a wide geographic area and is enriched in oil-polluted waters. The present findings are consistent with the view that it can proliferate in ecological niches not occupied by other organisms.

74-1189. Brooks, J. E.; Bowerman, A. M. (New York State Dept. Health, Bur. of Rodent Contr., Rodent Contr. Evaluation Lab., Troy, NY 12180). **Anticoagulant resistance in wild Norway rats in New York.** *J. Hyg. 71: 217-222; 1973.* (19 references)

Using animals from two landfill sites known not to have been exposed to anticoagulants for comparison, wild Norway rats collected from various locations in New York were tested for susceptibility to warfarin. A 6-day feeding of 0.005% warfarin in oatmeal bait produced 98% mortality for both sexes of the "susceptible" populations. Mortality was significantly different for males and females at earlier time points. Two rat populations survived a feeding period of six days on 0.005% warfarin: one in Cambridge on a turkey farm which utilized anticoagulants annually; and one in Selkirk on a chicken farm where anticoagulants were used whenever necessary.

74-1190. Franchetti, P.; Grifantini, M.; Martelli, S.; Stein, M. (Inst. Pharmaceutical and Organic Chem., Univ. Camerino, Italy). **Structure-activity relationships in reactivators of organophosphorus-inhibited acetylcholinesterase. 7. 1-Aryl-2-hydroxyiminomethyl-3-methylimidazolium iodides.** *J. Med. Chem. 17(1): 18-22; 1974.* (12 references)

A number of 1-aryl-2-hydroxyiminomethyl-3-methylimidazolium iodides were synthesized and found to reactivate eel AChE inhibited by DFP from 0.24 to 1.65 times as effectively as pralidoxime (2-PAM). The best reactivators were also generally the most potent inhibitors of AChE. Activity decreased in the order $Cl > OCH_3 \cong H > NO_2$, and para isomers were always less potent than ortho and meta isomers.

74-1191. Ito, N.; Nagasaki, H.; Arai, M.; Makiura, S.; Sugihara, S.; Hirao, K. (Cancer Cent. Inst., Nara Med. Univ., Kashihara, Nara, Japan). **Histopathologic studies on liver tumorigenesis induced in mice by technical polychlorinated biphenyls and its promoting effect on liver tumors induced by benzene hexachloride.** *J. Nat. Cancer Inst. 51(5): 1637-1646; 1973.* (34 references)

Male dd mice were maintained on diets containing varying quantities of technical polychlorinated biphenyls (PCBs) or on diets containing varying quantities of PCBs along with varying quantities of benzene hexachloride (BHC). Hepatocellular carcinomas were induced in mice fed diets containing 500 ppm Kanechlor 500, a PCB preparation which contains a large number of the chlorine compounds; no such changes were observed in mice maintained on diets containing Kanechlor 400 or Kanechlor 300. Amyloid degeneration in the liver was observed in mice fed diets containing 100 or 250 ppm Kanechlor 500, or 500, 400, or 300 ppm Kanechlor 400 or Kanechlor 300. Among the animals fed BHC alone, only the group receiving 250 ppm of the alpha-isomer developed nodular hyperplasia and hepatocellular carcinoma. Among the groups fed BHC plus PCBs, nodular hyperplasia and hepatocellular carcinoma developed in those receiving 100 or 50 ppm of α-BHC or 250 or 100 ppm β-BHC. Mice fed α-BHC with or without PCBs showed no neoplastic changes in the liver. Thus, PCBs induce liver neoplasms in mice as well as promoting the induction of tumors by alpha-BHC and beta-BHC.

74-1192. Turusov, V. S.; Deringer, M. K.; Dunn, T. B.; Stewart, H. L. (Int. Agency for Res. on Cancer, Lyon, France). **Malignant mouse-liver tumors resembling human hepatoblastomas.** *J. Nat. Cancer Inst. 51(5): 1689-1695; 1973.* (11 references)

Seventy-five liver tumors resembling human hepatoblastomas were found in male CF-1 mice, some of which had been treated with DDT. The incidence was 0.9% in the untreated animals and 3.8% in the DDT-treated animals. Twenty-four similar tumors were found in (YBR X AKR)F_1 and (DBA X YBR)F_1 hybrid mice, none of which had been treated with DDT; the incidence in this group was 6%. The tumors were invariably

detected in mice dying after 70 weeks of age and were almost invariably associated with the ordinary type of hepatoma. Of the tumors in the CF-1 animals, 15 metastasized to the lung and, in 1 mouse, also metastasized to a mediastinal lymph node and the wall of the bladder. Pulmonary nodules were found in 3 of the 24 hybrid mice having hepatoblastomas as well as the ordinary type of hepatoma. Histologically, the vascular component of the hepatoblastomas was prominent in many neoplasms, and organoid structures composed of undifferentiated cells were arranged around vascular channels or formed rows and rosettes. Osteoid formation was observed in four such neoplasms. Large hemorrhages, necrosis, fibrosis, and thick capsules were frequently encountered. The hepatoblastomas in the DDT-treated animals were more malignant than the ordinary hepatoma of the mouse.

74-1193. Olson, W. A.; Habermann, R. T.; Weisburger, E. K.*; Ward, J. M.; Weisburger, J. H. (Nat. Cancer Inst., Bethesda, MD 20014). **Induction of stomach cancer in rats and mice by halogenated aliphatic fumigants.** *J. Nat. Cancer Inst. 51(6): 1993-1995; 1973.* (11 references)

Ethylene dibromide (EDB) and 1,2-dibromo-3-chloropropane (DBCP) were administered via chronic oral intubation 5 times weekly to Osborne-Mendel rats and (C57BL X C3H)F_1 mice. Half of the animals were given the experimentally predetermined maximally tolerated dose of each drug, while the rest were given half of that dosage. DCBP produced mammary tumors in several female rats and squamous cell carcinomas of the stomach in some of the male rats; a high percentage of the male and female mice developed squamous cell carcinomas of the stomach. Squamous cell carcinoma of the stomach also developed in 62% of the male rats given the MTD and 98% of the male rats given half the MTD; the incidence of gastric carcinoma was somewhat less among the female rats. Preliminary results indicated that the mice were also developing this type of tumor. To avoid the possible health hazards associated with DBCP or EDB, workers handling these chemicals should use protective clothing, masks, and other means to avoid absorption of either material.

74-1194. Kar, P. P.; Matin, M. A. (Ind. Toxicol. Res. Cent., Chatter Manzil Palace, Lucknow, Uttar Pradesh, India). **Possible role of γ-aminobutyric acid in paraoxon-induced convulsions.** *J. Pharm. Pharmacol. 24(12): 996-997; 1972.* (11 references)

Phenobarbitone, administered at 50 mg/kg, protected rats from convulsions induced by 0.1 mg/kg paraoxon given one and a half hours later. Severe convulsions were observed in animals given 50 mg/kg isoniazid 1 hr prior to paraoxon administration. Rats protected by phenobarbitone from paraoxon-induced convulsions had an almost normal level of γ-aminobutyric acid in the brain, while those given paraoxon alone and paraoxon and isoniazid had levels about 30 and 40%, respectively, below normal. The paraoxon-induced reduction of brain γ-aminobutyric acid content may cause the convulsions.

74-1195. Kewitz, H.; Bitter, B. S. (Inst. Klinische Pharmakol. Freien Univ. Berlin, 1-Berlin 45, Hindenburgdamm 30, Germany). **Effectivity of obidoxime in brain and peripheral tissues in dogs poisoned by parathion.** *J. Pharmacol. 3(4): 563-564; 1972.*

Five mg/kg of obidoxime, administered 14-16 hr after 6 mg/kg parathion and 2 hr before sacrifice, completely reactivated the ChE activity of blood cells, heart, abdominal muscle and diaphragm in the dog. An increase from 28 to 45% in ChE activity also occurred in the thalamus and brain cortex at this dose, but the esterase in the basal ganglia and in the plasma was not altered. Some reactivation was observed in plasma and five areas of the brain with 20 mg/kg obidoxime.

74-1196. Satoh, T. (Dept. Pharmacol. and Toxicol., Inst. Food Microbiol., Chiba Univ., Narashino, Chiba, Japan). **A liver arylamidase extremely sensitive to organophosphorus compounds.** *Life Sci. 13(9): 1181-1188; 1973.* (20 references)

Inhibitory effect of 7 organophosphorus compounds on the liver isocarboxazid amidase was studied in rats. This enzyme is more sensitive to the relatively less toxic compounds, i.e., Sumithion (fenitrothion), malathion, and TOTP (tri-*o*-cresyl phosphate) than to the more toxic ones such as parathion, paraoxon, and EPN. As little as 0.5 mg/kg of Sumithion inhibited this arylamidase activity by approximately 28% in male and 37% in female rats. TOTP completely inhibited the arylamidase in a dose of 20 mg/kg, moreover, a significant sex difference in the TOTP-induced inhibition of the enzyme was observed. (Author abstract by permission)

74-1197. Sharma, R. P. (Dept. Vet. Sci., Utah State Univ., Logan, UT 84322). **Brain biogenic amines: depletion by chronic dieldrin exposure.** *Life Sci. 13(9): 1245-1251; 1973.* (15 references)

Chronic dietary exposure to dieldrin in mallard ducks caused an appreciable depletion of brain serotonin, norepinephrine, and dopamine, but not of gamma-aminobutyrate. Such alterations may account for the toxic effects in animals following chronic pesticide exposure. Changes in brain biogenic amines may possibly be related to behavioral disorders following exposure to such environmental contaminannts. (Author abstract by permission)

74-1198. Kacew, S.; Singhal, R. L. (Dept. Pharmacol., Fac. Med., Univ. Ottawa, Ottawa, Ontario, Canada K1N 6N5). **The influence of *p,p'*-DDT, α-chlordane, hepta-**

chlor, and endrin on hepatic and renal carbohydrate metabolism and cyclic AMP-adenyl cyclase system. *Life Sci. 13(10): 1363-1371; 1973.* (28 references)

Administration of an acute oral dose of *p,p'*-DDT (600 mg/kg), α-chlordane (200 mg/kg), heptachlor (200 mg/kg), and endrin (50 mg/kg) produced a significant rise in the concentration of serum glucose and urea and a lowering of hepatic glycogen. In addition, treatment with any of these insecticides significantly increased the activities of hepatic and renal pyruvate carboxylase, phosphoenolpyruvate carboxykinase, fructose 1,6-diphosphatase, and glucose 6-phosphatase, the four enzymes which play a key, rate-limiting role in the process of gluconeogenesis. Treatment with *p,p'*-DDT, α-chlordane, heptachlor, or endrin proved equally effective in elevating the levels of endogenous cyclic AMP and augmenting the activity of basal- and fluoride-stimulated forms of adenyl cyclase in both tissues. Whereas renal phosphodiesterase was decreased slightly by *p,p'*-DDT, the activity of this cyclic AMP-degrading enzyme remained unaltered following the administration of other pesticides. Our data indicate that the pesticide-induced alterations in carbohydrate metabolism of liver and kidney may be associated with an enhanced ability of these organs to synthesize cyclic AMP. (Author abstract by permission)

74-1199. Stevens, J. T.; Greene, F. E. (Dept. Pharmacol., Milton S. Hershey Med. Cent., Pennsylvania State Univ. Coll. Med., Hershey, PA 17033). **Response of the mixed function oxidase system of rat hepatic microsomes to parathion and malathion and their oxygenated analogs.** *Life Sci. 13(12): 1677-1691; 1973.* (24 references)

In vitro inhibition of ethylmorphine metabolism in rat hepatic microsomes by parathion, malathion, malaoxon, and paraoxon was not well correlated with their effects on NADPH oxidation, cytochrome C reduction, or the reduction of cytochrome P-450. A parallel relationship was observed between inhibition of ethylmorphine metabolism by parathion, malathion, and malaoxon and the binding affinity of these agents to microsomal cytochrome P-450 obtained from rats pretreated with an anticholinesterase agent, bis–[*p*-nitrophenol] phosphate. (Author abstract by permission)

74-1200. Desaiah, D.; Cutkomp, L. K.; Koch, R. B. (Dept. Entomol. Fisheries and Wildlife, Univ. Minnesota, St. Paul, MN 55101). **Inhibition of spider mite ATPases by Plictran and three organochlorine acaricides.** *Life Sci. 13(12): 1693-1703; 1973.* (15 references)

The ATPase enzyme system from two-spotted spider mites, *Tetranychus urticae* (Koch) was sensitive, in vitro, to four acaricides. Tricyclohexylhydroxytin (Plictran) was an outstanding inhibitor of oligomycin-sensitive (mitochondrial) Mg^{2+}ATPase from fish brain and spider mite homogenates. The I50 values were 6.6 × $10^{-11}M$ and 6.2 × $10^{-10}M$, respectively. Less effective were chlorbenside, chlorfenethol, and ovotran. Plictran at a higher concentration (2 × $10^{-7}M$) was also more effective on Na^+-K^+ATPase both in mites and fish brain homogenates as compared to chlorfenethol, chlorbenside, and ovotran. Plictran inhibited oligomycin-insensitive Mg^{2+}ATPase at concentrations of $10^{-8}M$ but stimulated at high concentrations (5 × $10^{-6}M$ and higher). (Author abstract by permission)

74-1201. Freeling, M. (Dept. Genet., Univ. California, 345 Mulford Hall, Berkeley, CA 94720). **Simultaneous induction by anaerobiosis or 2,4-D of multiple enzymes specified by two unlinked genes: differential *Adh*1-*Adh*2 expression in maize.** *Mol. Gen. Genet. 127: 215-227; 1973.* (13 references)

Alcohol dehydrogenase was induced in maize seedlings exposed to 2,4-D at 40μg/ml in the presence of air. Induction rates obtained fit zero-order kinetics reasonably well but were lower than those obtained by anaerobic induction. As was the case during anaerobic induction without 2,4-D, the ratios of sets of isozymes were indistinguishable with 24- or 53-hr induction times. Induction is apparently an expression of two unlinked genes, *Adh*1 and *Adh*2, and is repressed by air. The mechanism of this repression and the way in which 2,4-D and other auxins overcome it are being investigated.

74-1202. Sharp, C. W.; Hunt, D. G.; Clements, S. T.; Wilson, W. E. (Pathol. Physiol. Branch, Nat. Inst. Environ. Health Sci., Research Triangle Park, NC 27709). **The influence of dichlorodiphenyltrichloroethane, polychlorinated biphenyls and anionic amphiphilic compounds on stabilization of sodium- and potassium-activated adenosine triphosphatases by acidic phospholipids.** *Mol. Pharmacol. 10(1): 119-129; 1974.* (41 references)

Dichlorodiphenyltrichloroethane (DDT), extensively chlorinated biphenyls, deoxycholate, and phospholipase A inhibited beef brain and rabbit kidney (Na^+ + K^+)-ATPases (EC 3.6.1.3). Phosphatidylserine or phosphatidylinositol but not phosphatidylcholine or phosphatidylethanolamine prevented or reversed the inactivation of the enzymes by each of these inhibitors. Albumin protected against and reversed inactivation of (Na^+ + K^+)-ATPases by deoxycholate, oleate, or dodecyl sulfate; however, this protein was less effective against inactivation by the extensively chlorinated hydrocarbons. The extent of (Na^+ + K^+)-ATPase inactivation by anionic amphiphiles was dependent upon the temperature at which an enzyme-inhibitor mixture was incubated prior to assay, whereas inactivation by chlorinated hydrocarbons was not affected by temperature. Our experiments lead to the hypothesis that acidic phospholipids are necessary for stabilization of the enzyme and that chlorinated hydrocarbons, deoxycholate, and

phospholipase A interfere with the stabilization process. (Author abstract by permission of Academic Press)

74-1203. Wild, D. (Zentrallaboratorium Mutagenitaetspruefung Deutschen Forschungsgemienschaft, Freiburg i. Br., Germany). **Chemical induction of streptomycin-resistant mutations in *Escherichia coli*.** *Mutat. Res. 19(1): 33-41; 1973.* (25 references)

Using induction of resistance to streptomycin in a streptomycin-sensitive *E. coli* strain as test system, the mutagenic properties of dichlorvos and methyl methanesulfonate were compared. The technique was improved by suspending cells in agar and allowing minimum exposure to temperatures as high as 45°C. At doses from 5-25 mM and exposure times from 1-10 hr, dichlorvos induced streptomycin-resistant mutations, and at doses from 1-4 mM and exposure times from 0.5-6 hr, methyl methanesulfonate induced mutations. Survival of the cells in both cases was generally greater than 50%. Both compounds produced non-linear dose-response curves, with higher doses yielding more mutants per unit dose than lower doses.

74-1204. Chandler, L. R.; Fahrig, R. (Zentrallaboratorium fuer Mutagenitaetspruefung, Freiburg, Germany). **Chemical reactivity and the dose-response curves of monofunctional alkylating agents.** *Mutat. Res. 21(1): 6-7; 1973.*

Evaluation of the genetic risks involved in exposure of the human population to small amounts of a chemical mutagen for several years depends on a rigorous study of the time-function and concentration-function for genetic alterations. It is of primary importance to determine if chemical reactions causing mutation at high concentrations occur at environmental concentrations. Genetic studies with dichlorvos, dimethoate, SN1 and SN2 type alkylating agents, and an acridine have been carried out to elucidate these factors.

74-1205. Amo, H. (School of Hyg., Fac. of Med., Nagoya Municipal Univ., Nagoya, Japan). **[Effect of oral administration of CN and heavy metals in long term on breeding and chromosome analyses of mice.]** *Nagoya-Shiritsu Daigaku Igakkai Zasshi (J. Nagoya City Univ. Med. Ass.) 24(1): 48-66; 1973.* (48 references) (Japanese)

The acute toxicity of phenylmercury acetate (PMA) was determined by injecting i.p. 0.2 ml of aqueous solutions of various concentrations of the compound to male C57BL mice daily for five successive days and recording the mortality after seven days. The LD50 (one week) was 49.0 mg/kg. Twenty goldfish were kept in aqueous solutions of the compound at various concentrations for a week to determine the TLm. The TLm (one week) by Doudoroff's method was 0.0078 ppm. Aqueous solutions of PMA, cadmium nitrate, and potassium cyanide at their respective LD50's were injected i.p. to male mice to study effects on chromosomes. The frequency of occurrence of 40 chromosomes was 72.3% as compared to 88.8% in controls; the frequency of 39 was 11.3% and that of 41 was 9.0% but without any change in karyotype. An aqueous solution of PMA at the TLm concentration was orally administered to the mice daily for a long time resulting in mortalities of 20% in males and 60% in females with average survival times of 120 and 317 days, respectively. The numbers of pregnancies and offspring produced did not differ between treated mice and controls.

74-1206. Engst, R.; Raab, M. (Forschungszentrum fuer Molekularbiologie und Medizin, Zentralinstitut fuer Ernaehrung, Potsdam-Rehbruecke, DDR). **Zum Metabolismus fungizider Phthalimid-Derivate in lebensmittelchemisch- toxikologischer Sicht. [Bromatotoxic aspects of the metabolism of fungicidal phthalimide derivatives.]** *Nahrung 17(7): 731-738; 1973.* (18 references) (German)

The effects, biochemical action, and metabolism of ^{35}S-labeled captan were studied in rats. Rats, like other warm-blooded animals, resorbed captan rapidly. Captan was also rapidly metabolized and virtually completely excreted in the feces within three days. Ingestion of a single 5% LD50 dose markedly reduced the erythrocyte SH group levels (by 54% after 3 hr and by 25% after 24 hr). The SH levels in serum and liver also decreased significantly by 18% and 11%, respectively. SGPT and lactate dehydrogenase activities were reduced by nearly 20%. Neither thin-layer chromatographic nor gas chromatographic methods revealed the presence of intact captan in the blood and the organs of the rats. Only the metabolites tetrahydrophthalimide and tetrahydrophthalic acid were temporarily found in the blood. The split-off side chain could not be detected by thin-layer and gas chromatography. The results indicate that phthalimide-based fungicides do not accumulate in the animal body.

74-1207. Edwards, C. A.; Jeffs, K. (Rothamsted Exp. Sta., Harpenden, Hertfordshire, England). **Rate of uptake of DDT from soil by earthworms.** *Nature (London) 247(5437); 157-158; 1974.* (10 references)

The uptake and excretion of DDT by earthworms living in soil containing 1 ppm DDT was studied. The uptake experiments indicated that there was an initial fairly rapid uptake, followed by some loss, then a further uptake; equilibrium was reached after about 1 month when the worms had accumulated the maximum amount of DDT residues from the soil. The conversion of DDT to DDE appeared to continue in the worms: nearly half the DDT taken up by the worms was converted to DDE in 4 to 6 months; and in worms that had been exposed to DDT for a long time, nearly all the residues were DDE. Worms placed in untreated soil

excreted DDT rapidly, but some of the DDE persisted in their tissues for several months. Thus DDE seems to persist longer in worm tissues than DDT.

74-1208. Fukuhara, T.; Kaisa, H.; Tahara, E.; Yamada, A. (Second School of Pathology, Faculty of Med., Hiroshima Univ., Hiroshima City, Hiroshima, Japan). **[Experimental study on the effect of *O,O*-di-*n*-propyl-*O*-(4-methylthiophenyl)-phosphate on the liver by long term administration of micro dose rate].** *Nippon Byori Gakkai Kaishi (Trans. Soc. Pathol. Jap.) 62: 250-251; 1973.* (Japanese)

An organophosphorus pesticide, *O,O*-di-*n*-propyl-*O*-(4-methylthiophenyl)-phosphate, which is not yet registered as a pesticide for agricultural use, was mixed with a standard diet (Oriental MC powder) at 800, 400, 200 and 0 ppm and administered to 100 male and female rats, six months old, for 15 months. Tissues from animals sacrificed between the third and the 15th month were examined. In the earlier stages of administration fatty degeneration of the liver at the lobular margin or necrosis of liver cells accompanying the accumulation of inflammatory cells in the sinusoids and swelling of the Kupffer cells with partial necrosis was observed. Numerous inflammatory cells, including eosinocytes, infiltrated into Glisson's capsule. Some animals showed a tendency to fibrinosis after six months of pesticide administration and after 15 months, definite hepatic fibrinosis was observed. The major electron microscopic changes were accumulation of neutral fat, degranulation of rough-surfaced follicles, increase of smooth-surfaced follicles, and swelling and deformation of mitochondria. About half of the animals fed the pesticide for more than 12 months showed hepatic fibrinosis. The degree of transformation did not necessarily parallel the dose level nor the duration of administration, suggesting individual sensitivity to hepatic injury by the pesticide. Long-term administration of trace amounts of this pesticide might cause liver cirrhosis.

74-1209. Araki, M.; Otsuka, J.; Mizuhira, V. (School of Ophthalmol., Faculty of Med., Tokyo Med. & Dent. Univ., Tokyo, Japan). **[Investigation of ciliary muscle of a chronically organo-phosphorus intoxicated beagle by means of the electron microscope and analytical electron microscope.]** *Nippon Ganka Gakkai Zasshi (J. Jap. Ophthalmol. Soc.) 77(11): 1923-1935; 1973.* (21 references) (Japanese)

Ethylthiometon was administered orally at 10 mg/day to a six-month-old beagle for 2 years; the total amount of insecticide given was 4600 mg. The ciliary muscle was then removed, fixed, stained with bismuth, and doubly stained with uranyl and lead. It was examined under the electron microscope after carbon film replication. The findings were indicative of muscle degeneration, and included elongated nuclei, disappearance of heterochromatin, destruction and deformation of mitochondria accompanying partial demyelination, moderate disappearance of myofilament with segregation of remaining myofilament, generally obscured semidesmosome, and vacuolation of cytoplasm with snake-shaped tubular structures opening into the basement membrane, suggesting intake and discharge into the cell and basement membrane, respectively. Precise examination revealed that the distance between muscle cells had increased conspicuously (0.5-1.0 μ), and the intracellular space was filled with material of high electron density. The basement membrane around the capillaries showed conspicuous thickening to 2000-5000 A without denaturation of wall cells, vacuole formation, and proliferation of reticular fibers or layer structures. The main abnormal finding on analytical electron microscope examination of the thickened basal membrane between the muscle cells was a specific high sulfur peak. The anticipated presence of Bi could not be confirmed due to overlapping of two peaks, the 2.41 KeV of Bi (M-alpha) and 2.3 KeV of S (K-alpha), as well as 10.7 KeV of Bi (L-alpha) and 10.4 KeV of Pb (L-alpha). However, the basal membrane showed greatly increased electron density only when stained with Bi, so that the uptake of Bi seems certain.

74-1210. Ando, M.; Wakizaka, I. (School of Public Health, Faculty of Medicine, Kagoshima Univ., Kagoshima, Japan). **[Metabolism and distribution of DDT in rat body.]** *Nippon Koshu Eisei Zasshi (Jap. J. Pub. Health) 20(10S): 407; 1973.* (Japanese)

Five groups of adult male and female rats were administered DDT at respective rates of 4.77, 9.62, 19.8, 42.3, or 108 μg/g b.w. per day for 12 days. On the 12th day the accumulated amount of DDT, total lipid, and triglycerides were determined. Beyond the point where the dose of DDT amounted to about 20 μg/g b.w., DDT residues in the rat liver increased linearly. Total liver lipid did not increase as the total amount of DDT increased from zero to about 90 μg/g b.w. Liver triglycerides decreased rapidly at first, and after the dose of DDT amounted about to 20 μg/g liver, they continued to decrease more slowly. The fact that the accumulated amount of DDT which affected lipid metabolism could not be considered negligible must not be overlooked in evaluating DDT pollution.

74-1211. Burdick, G. E.; Dean, H. J.; Harris, E. J.; Skea, J.; Karcher, R.; Frisa, C. (New York State Dept. Environ. Conservation, Cornell Univ., Ithaca, NY). **Effect of rate and duration of feeding DDT on the reproduction of salmonid fishes reared and held under controlled conditions.** *N. Y. Fish Game J. 19(2): 97-115; 1972.* (6 references)

Below 3 mg/kg/wk, DDT fed to female trout had no significant effect on survival of eggs or resultant fry. When female brown trout were fed 3.39 mg/kg for 44 wk, significantly lower survival was observed during the

period after feeding of fry was begun. Approximately 100% mortality of fry resulted from feeding lake trout females 6 mg/kg DDT weekly, and under different conditions no females fed this dose matured eggs. In brook trout, fry were also most sensitive to DDT in the stage from feeding to 40 days after hatching. Comparison of the effects of DDT and residues in the eggs in these fish showed that brook trout were probably more sensitive to the pesticide than lake trout.

74-1212. Avrahami, M.; Gernert, I. L. (Wallaceville Animal Res. Cent., Ministry Agr. and Fish., Upper Hutt, New Zealand). **Distribution, metabolism, and excretion of ^{32}P-labelled fensulfothion in sheep.** *N. Z. J. Exp. Agr. 1(2): 197-202; 1973.* (3 references)

The specific radio-tracer technique was used to determine the distribution, metabolism, and excretion of ^{32}P-labeled fensulfothion in two wether hoggets. One sheep exhibited progressive symptoms typical of organophosphate 12 hr after dosing; the other sheep survived, showing lethargy and some discomfort 30 to 35 hr after dosing. Fensulfothion was absorbed rapidly from the digestive tracts of both animals, and ^{32}P activity in the blood reached a peak 1 to 2 hr after dosing. In the surviving sheep the level of activity decreased logarithmically over a 7-day period; in the other animal the initial peak was followed by a further rise in ^{32}P levels. Before dying the second sheep excreted 54% of the ^{32}P administered; the surviving animal excreted 65% of the label during the first 24 hr and within 7 days 96% of the label had been excreted. Virtually all of the ^{32}P in the urine was present as hydrolysis products of fensulfothion. Compared with the urine, the feces were a minor route of excretion. Significant pesticide residues were found in the organs of the sheep which died; after 7 days, only negligible amounts of fensulfothion and its oxidation and hydrolysis products were found in the organs of the surviving sheep.

74-1213. Avrahami, K. (Wallaceville Anim. Res. Cent., Min. Agr. Fish., Private Bag, Upper Hutt, N. Zealand). **Systemic transfer of ^{32}P-labelled fensulfothion from soil into pasture plants: a note.** *N. Z. J. Exp. Agr. 1(2): 203-206; 1973.* (3 references)

In pot trials, ^{32}P-labeled fensulfothion was taken up from treated soil by white clover and ryegrass and converted to hydrolysis products. The rate of uptake was about twice as high in ryegrass as in white clover and with each pasture plant about 4 times as much was absorbed after an application equivalent to 44 kg/ha as after 22 kg/ha. In soil only 4.5% of the radioactivity was hydrolyzed in 40 days, and fensulfothion and fensulfothion sulfone were the only significant residues. Plants contained fensulfothion, fensulfothion sulfone, fensulfothion oxygen analog sulfoxide and sulfone plus noncholinergic hydrolysis products. The hydrolyte fraction accounted for about 33% of the radioactivity in 10- to 14-day-old plants and about 50% in 22- to 29-day-old plants.

74-1214. Stanton, R. H.; Khan, M. A. Q. (Dept. Biol. Sci., Univ. Illinois at Chicago Circle, Chicago, IL 60680). **Mixed-function oxidase activity toward cyclodiene insecticides in bass and bluegill sunfish.** *Pestic. Biochem. Physiol. 3(4): 351-357; 1973.* (18 references)

More than half of the mixed function oxidase activity in adult bluegill liver, using aldrin as substrate, was found in the microsomal fraction. Aldrin epoxidation was inhibited by CO, did not proceed in the absence of NADPH, and was optimum at a pH of 8.2-8.4. While the activity of aldrin epoxidation in bluegill adults was 13% of that found in adult mice, bluegill fry had 73% of the activity in mice and bass fry had 35%. Two products, 2,3-chlordene epoxide and one tentatively identified as chlordene hydroxide, were recovered when mixed-function oxidase preparations from mice and bluegill fry were incubated with chlordene and when minnows were exposed to chlordene in vivo. Naphthalene and endrin inhibited the formation of both products indiscriminately with no build-up of one or the other. Mice generally had a higher reaction velocity for aldrin epoxidase than fish at lower substrate concentrations. Isodrin, endrin, and photoaldrin inhibited the conversion to varying degrees.

74-1215. Abo-Khatwa, N.; Hollingworth, R. M. (Dept. Entomol., Purdue Univ., West Lafayette, IN 47907). **Chlordimeform: uncoupling activity against rat liver mitochondria.** *Pestic. Biochem. Physiol. 3(4): 358-369; 1973.* (33 references)

In vitro experiments with rat liver mitochondria confirmed the general uncoupling properties of chlordimeform and indicated that its site of action and potency are similar to those of the classic uncoupler, 2,4-DNP. With the addition of 0.02 μg/mg of protein, chlordimeform caused a 34.3% and 71.0% decrease in oxidative phosphorylation and respiratory control, respectively, while state 4 respiration was increased 73.5%. The activity of chlordimeform increased as the mitochondrial protein concentration was reduced, and a single washing restored normal respiration of mitochondria treated with 0.04 μg of chlordimeform or 2,4-DNP per mg of protein. Bovine serum albumin also reversed the uncoupling activity of chlordimeform. Inhibition of state 3 respiration by oligomycin and atractylate was completely reversed by chlordimeform, and the pesticide stimulated ATPase activity.

74-1216. Cappon, I. D.; Nicholls, D. M. (Dept. Biol., York Univ., Downsview M3J IP3, Toronto, Ontario, Canada). **Factors involved in increased protein synthesis in rat liver after administration of DDT.** *Pestic. Biochem. Physiol. 3(4): 408-419; 1973.* (38 references)

Liver microsomes from DDT-treated rats incubated with S105 fraction of liver from DDT-treated rats incorporated labeled phenylalanine into protein 2 times faster than control liver microsomes incubated with control S105 supernatant. A marked increase in specific activity of protein was observed in livers obtained from rats treated with DDT and injected with ^{14}C-phenylalanine, indicating that increased incorporation occurred in vivo. A 30-40% increase in incorporation of labeled phenylalanyl-tRNA into peptide occurred when microsomes from DDT-treated rats were incubated with pH5 supernatant (freed of synthetases, tRNA, and RNA) from controls and endogenous mRNA or excess poly-U. When control ribosomes were incubated with S105 fraction from treated animals and vice versa, the incorporation was intermediate between that obtained with control ribosomes and S105 fraction and DDT ribosomes and S105 fraction, suggesting that factors responsible for the increase occur in both fractions. Salt-washed ribosomes from treated rats, freed of elongation factor 1 and 2, showed no increased incorporation.

74-1217. Black, A. L.; Chiu, Y. C.; Fukuto, T. R.; Miller, T. A. (Div. Toxicol. Physiol., Dept. Entomol., Univ. California, Riverside, CA 92592). **Metabolism of 2,2-dimethyl-2,3-dihydrobenzofuranyl-7 *N*-methyl-*N*-(2-toluenesulfenyl)carbamate in the housefly and white mouse.** *Pestic. Biochem. Physiol. 3(4): 435-446; 1973.* (15 references)

Following administration of labeled *N*-(2-toluenesulfenyl) carbofuran to mice a major portion of radioactivity was recovered in the urine within 24 hours. The feces contained a total of 3.2 and 5.6% of the recovered radioactivity for ring-^{14}C and carbonyl-^{14}C labels, respectively. Most of the urinary metabolites were present as water-soluble conjugates and included 3-hydroxy-*N*-CH_2OH-carbofuran, 3-hydroxy-carbofuran, and three phenolic compounds. Carbonyl-labeled *N*-(2-toluenesulfenyl) carbofuran was metabolized to a greater extent than carbofuran when mice were given 0.2 mg/kg of the chemical and expiration of $^{14}CO_2$ was monitored. The greater susceptibility of the *N*-arylsulfenyl carbamate to degradation is probably partially responsible for its lower toxicity. Rapid metabolism of *N*-(2-toluenesulfenyl) carbofuran was observed in the housefly, but carbofuran was recovered in small, potentially lethal, amounts from housefly tissue. The rate of metabolism of both compounds in the housefly was similar and was significantly less than that observed in the mouse. Toxicity and anti-ChE activity from mice and houseflies indicate that carbofuran is the primary toxicant to houseflies.

74-1218. Miranda, C. L.; Webb, R. E.; Ritchey, S. J. (Dept. Human Nutr. Foods, Virginia Polytechnic Inst. and State Univ., Blacksburg, VA 24061). **Effect of dietary protein quality, phenobarbital and SKF 525-A on heptachlor metabolism in the rat.** *Pestic. Biochem. Physiol. 3(4): 456-461; 1973.* (9 references)

Heptachlor epoxidase activity was significantly reduced in livers of rats fed gluten instead of casein as protein source. Limiting the casein diet by pair feeding increased activity. Inhibition of heptachlor epoxidase activity by SKF 525-A pretreatment was 27% in rats fed protein-deficient gluten diet, 48% in animals pair-fed casein diet, and 51% in rats fed casein diet ad lib. The enzyme activity was enhanced by pretreatment with phenobarbital 11-fold in gluten-fed animals, 6-fold in pair-fed animals, and 7-fold in animals fed casein diet ad lib.

74-1219. Bartels, P. G.; Hilton, J. L. (Dept. Biol. Sci., Univ. Arizona, Tucson, AZ 85721). **Comparison of trifluralin, oryzalin, pronamide, propham, and colchicine treatments on microtubules.** *Pestic. Biochem. Physiol. 3(4): 462-472; 1973.* (23 references)

In an investigation to determine the mode of action of trifluralin, pronamide (propamide), and oryzalin, the herbicides did not inhibit the in vitro polymerization of purified pig brain microtubule protein into microtubules and did not bind to the microtubular protein, as did colchicine. Although all four compounds caused the loss of both cortical and spindle microtubules in root cells of wheat and corn, the herbicides probably interfere with synthesis of microtubular protein or metabolism of endoplasmic reticulum membranes involved in microtubule assembly, instead of directly affecting the microtubules. Propham-treated roots had cortical microtubules, but they were disoriented within the cell.

74-1220. Frear, D. S.; Swanson, H. T. (Agr. Res. Serv., U.S.D.A., Metab. Radiation Res. Lab., Fargo, ND 58102). **Metabolism of substituted diphenylether herbicides in plants. I. Enzymatic cleavage of fluorodifen in peas (*Pisum sativum* L.).** *Pestic. Biochem. Physiol. 3(4): 473-482; 1973.* (25 references)

A 32-fold purification of a "soluble" glutathione *S*-transferase that catalyzes the cleavage of fluorodifen was achieved. The enzyme, obtained from pea plants, was specific for reduced glutathione, with an apparent *K*m of 7.4×10^{-4} *M*, and had a pH optimum of 9.3-9.5. Cotton, corn, peanut, soybean, and okra, all fluorodifen-tolerant plants, contained higher levels of the enzyme than tomato, cucumber, and squash, which are susceptible species. *S*-(2-nitro-4-trifluoromethylphenyl)-glutathione and *p*-nitrophenol, in a 1:1 ratio, were the reaction products of pea epicotyl glutathione *S*-transferase catalyzed fluorodifen cleavage. Nitrofen, methyl-5-(2′,4′-dichlorophenoxy)-2-nitrobenzoate, and 2-amino-4′-nitro-4-trifluoromethyl diphenylether did not serve as substrates for the reaction, but strongly inhibited the cleavage of fluorodifen while atrazine did not serve as substrate or inhibit the reaction. Diuron, linuron, and chloroxuron and trifluralin were also inhibitors of fluorodifen cleavage.

74-1221. Shimabukuro, R. H.; Lamoureux, G. L.; Swanson, H. R.; Walsh, W. C.; Stafford, L. E.; Frear, D. S. (Agr. Res. Serv., U.S.D.A., Metab. Radiation Res. Lab., Fargo, ND 58102). **Metabolism of substituted diphenyl-ether herbicides in plants. II. Identification of a new fluorodifen metabolite, *S*-(2-nitro-4-trifluoromethylphenyl)-glutathione in peanut.** *Pestic. Biochem. Physiol. 3(4): 483-494; 1973.* (22 references)

Peanut leaves rapidly absorbed labeled fluorodifen from solution and metabolized about 91% of the absorbed material in 24 hours. Only one radioactive component, *p*-nitrophenol, was recovered from hydrolysis of the aqueous fraction of leaf homogenate. Two major and one minor water-soluble metabolites were formed from the 2-nitro-4-trifluoromethylphenyl moiety. Extensive work on one of the major metabolites showed it to be *S*(2-nitro-4-trifluoromethylphenyl)-glutathione, identical to that produced by glutathione *S*-transferase from pea epicotyls.

74-1222. Stevens, J. T. (Dept. Pharmacol., Milton S. Hershey Med. Cent., Pennsylvania State Univ. Coll. Med., Hershey, PA). **The effect of parathion on the metabolism of ^{3}H-testosterone by hepatic microsomal enzymes from the male mouse.** *Pharmacology 10(4): 220-225; 1973.* (8 references)

The in vitro effects of parathion on the metabolism of testosterone by enzymes derived from the hepatic microsomes of adult, male, Swiss-Webster mice were studied. 16-α- and 6-β-hydroxytestosterone were the major polar metabolites of the mouse liver microsomes. Parathion (0.1 m*M*) reduced the formation of these two metabolites by 40.5 and 61.4%, respectively. The 7-α metabolite of testosterone was not significantly affected by the addition of parathion. Although parathion in concentrations of 0.01 m*M* did not significantly alter the pattern of testosterone metabolism, the total amount of testosterone metabolized indicates that this concentration, as well as the 0.1 m*M* concentration, produced metabolic inhibition.

74-1223. Sharma, M. P.; Vanden Born, W. H. (Dept. Plant Sci., Univ. of Alberta, Edmonton, Alberta, Canada). **Uptake, cellular distribution, and metabolism of ^{14}C-picloram by excised plant tissues.** *Physiol. Plant. 29(1): 10-16; 1973.* (27 references)

Soybean hypocotyl sections, barley coleoptile sections, Canada thistle leaf discs, and barley leaf sections were incubated in media containing 0.5 μCi/ml of the potassium salt of ^{14}C-labeled picloram. All of the excised plant tissues readily took up picloram from the liquid medium, with the barley leaf sections accumulating it to a concentration higher than that of the external medium. Actinomycin D and cycloheximide inhibited the uptake of picloram by the excised soybean hypocotyl and barley coleoptile sections, indicating that RNA and/or protein synthesis is in some way related to the uptake of picloram by excised plant tissues. The uptake of ^{14}C-picloram was promoted by added ATP and sucrose and increased with an increase in temperature from 5 to 35°C. After an 8 hour period, the excised sections released up to 30% of the absorbed picloram into a clean buffer solution within a 4 hr period. Following differential centrifugation of aqueous extracts of ^{14}C-picloram-treated excised tissues, more than 95% of the radioactivity was in the soluble fraction. In excised barley and Canada thistle leaf tissues, part of the pesticide was conjugated with plant constituents, largely sugar(s), 3 days after treatment. Following acid hydrolysis of the ethanol extracts of such tissues, only unaltered picloram was detected. Conjugation products of ^{14}C-picloram were not detected in the barley coleoptile and soybean hypocotyl sections.

74-1224. Mehendale, H. M. (Nat. Inst. Environ. Health Sci., NIH, Research Triangle Park, NC 27709). **Aldrin epoxidation by plant root extracts.** *Phytochemistry 12(7): 1591-1594; 1973.* (6 references)

Aldrin epoxidase activity of cell-free root preparations of Alaska pea and dwarf beans was located almost entirely in the 250,000 *g* pellet after centrifugation. Although NADPH stimulated the activity of this enzyme in crude homogenate, addition of NADPH to pellet material did not enhance activity. At concentrations below $10^{-3}M$ PABA increased dieldrin formation by crude homogenate, probably by selectively inhibiting polyphenol oxidase which could release interfering compounds. Homogenates of seeds which had germinated up to 88 hr did not contain any aldrin or heptachlor epoxidase activity.

74-1225. Buchenauer, H.; Erwin, D. C.; Keen, N. T. (Inst. fuer Phytopathol. und Pflanzenschutz, Univ. Hohenheim, 7000 Stuttgart 70, Germany). **Systemic fungicidal effect of thiophanate methyl on verticillium wilt of cotton and its transformation to methyl 2-benzimidazolecarbamate in cotton plants.** *Phytopathology 63(9): 1091-1095; 1973.* (11 references)

Only methyl 2-benzimidazolecarbamate (active metabolite of benomyl) was detected in the xylem of cotton plants 21 days after root or foliar treatment with this compound or thiophanate-methyl (TPM). The fungicides moved into bark, but not xylem, of nonsprayed stem below the treated area. After foliage and stems of plants were sprayed with TPM at 15,000 μg/ml, 8 μg/g TPM and 3 μg/g methyl 2-benzimidazole carbamate were recovered from tissue on the second day, and the values were 2 and 4 μg/g on the eleventh day. In vitro conversion of TPM to methyl 2-benzimidazole carbamate was more rapid at high pH than at low pH.

74-1226. Houseworth, L. D.; Tweedy, B. G. (Dept. Plant Pathol., Univ. Missouri, Columbia, MO 65201). **Effect of atrazine in combination with captan or thiram**

upon fungal and bacterial populations in the soil. *Plant Soil 38: 493-500; 1973.* (12 references)

Captan and thiram added at a rate of 10 mg/kg to soil subsequently planted with corn, wheat, or beans initially decreased fungal populations in greenhouse experiments. Populations almost normalized after 108 days. When atrazine was added at a rate of 10 mg/kg to soil planted with corn, the corn and microbial populations were not affected. However, atrazine added to soil planted with wheat or beans susceptible to it stimulated microbial growth, which could be attributed to the increase in decay of dead plant material. Synergistic or antagonistic effects were not observed when the fungicides and herbicides were applied in combination.

74-1227. Sethunathan, N.; Yoshida, T. (Cent. Rice Res. Inst., Cuttack-6, India). **Degradation of chlorinated hydrocarbons by *Clostridium* sp. isolated from lindane-amended, flooded soil.** *Plant Soil 38: 663-666; 1973.* (7 references)

Resting cells of *Clostridium* sp., isolated from flooded soil amended with lindane, decomposed methoxychlor and lindane (γ-BHC), and to a lesser extent heptachlor under anaerobic conditions. No appreciable degradation was noted when cells were heat-killed. A metabolite of lindane, previously reported, was again observed on GC analysis, but no additional peaks appeared for methoxychlor or heptachlor. A loss of radioactivity occurred in the degradation of ^{14}C-lindane, but very little CO_2 and no methane were detected in gases evolved from unlabeled incubation mixtures.

74-1228. Mull, R. L. (Dept. Environ. Toxicol., Univ. California, Davis, CA 95616). **Toxicology—toxicity and hazards.** *Proc. Annu. Calif. Weed Conf. 25: 73-80; 1973.* (5 references)

A number of factors affect the toxicity of a pesticide and consequently the hazard it presents to user and nontarget animals. The route and frequency of exposure and dose are primary considerations. Contamination with a second, more toxic chemical has been a significant factor in the teratogenesis attributed to some preparations of 2,4,5-T. There appears to be little hazard posed in field applications, however, since the contaminant is degraded under UV light. The toxicity of a pesticide has been carefully considered in preparation of labels, and users are advised to follow instructions explicitly.

74-1229. Crowe, M. W. (Dept. Vet. Sci. Univ. Kentucky, Lexington, KY). **A study of the teratogenic capability of tobacco (*Nicotiana tabacum*) and those chemicals commonly applied to the growing plant.** *IN: Proceedings of the Tobacco and Health Workshop Conference, No. 3. Tobacco and Health Research Institute, Lexington, Kentucky, Jan. 11-13, 1972, pp. 256-266.* (9 references)

Tobacco stalks and extracts and several chemicals normally applied to tobacco plants are currently being tested for teratogenic effects in pigs, rabbits, mice, and guinea pigs during different stages of pregnancy. To date, fetuses of dieldrin-treated animals have been normal, but deformities have been observed in one litter of pigs from a dam fed tobacco stalks at varying intervals between day 10 and day 51 of pregnancy and in 2 litters from rabbits dosed with nicotine at 20 mg/kg orally on days 7, 9, 11, 13, 15, and 17 of pregnancy. The pigs had arthrogryposis of the carpus of both front legs. Skeletal anomalies of three types were found in rabbit fetuses.

74-1230. Mikolajczak, B.; Tomaszewska, B. (Inst. of Physiology and Inst. of Infectious Diseases, Veterinary Dept. of Higher School of Agriculture in Wroclaw, Poland). **Toksycznosc Carbamultu dla pszczol w warunkach laboratoryjnych i jego wykrywanie w zatrutych owadach. [The toxicity of Carbamult to bees under laboratory conditions, and detection of this insecticide in intoxicated insects.]** *Pszczelnicze Zesz. Nauk. 16: 197-206; 1972.* (10 references) (Polish)

Carbamult (promecarb) is used as a contact insecticide in the form of a suspension in water. A study was performed on 47 groups of experimental bees and 11 control groups, 100 bees in each. The mortality of the bees was recorded 24, 48, 72, 96, 120, and 144 hours after the bees were given contaminated food or after the beginning of contact with the preparation, deposited on the inner surface of the experimental hive. Carbamult at concentrations of 0.005-0.15% in syrup, corresponding to the concentrations applied in agriculture, killed all test bees within 24 hours. In contact experiments, the preparation was deposited at rates of 0.025-7.5 mg on the 750 cm^2 surface of the inner walls of a hive. Levels greater than 2.5 mg, corresponding to the application rates used in agriculture, were highly toxic. Paper chromatography was used to detect Carbamult active ingredient. Carbamult appeared as a pinkish-red spot at *Rf* 0.420. Carbamult levels similar to those in experimentally poisoned bees were determined in bees accidentally poisoned in the field in 1968.

74-1231. Egyed, M. N.; Baranchuk, J.; Shoenbaum, M. (Kimron Vet. Inst., Bet Dagan, Israel). **The effect of feeding Cyolane-treated lucerne hay to calves.** *Refuah Vet. 29(4): 158-161; 1972.* (8 references)

Two Israeli-Friesian heifer calves aged 8 and 13 months and one Israeli-Friesian male calf aged 8 months were maintained for 52 days on a diet consisting of a commercial concentrate mixture and a batch of lucerne hay which had been sprayed eight months earlier with 250 ml (250 g/liter) commercial phosfolan per dunam. The lucerne hay was withheld for the following three months then fed again for two weeks, this time without any other feed. All three animals had mild diarrhea on

the day after the first offering of the sprayed hay. All animals preferred their straw bedding over the treated hay. Two weeks after the start of the experiment, the whole blood cholinesterase activity (ChE) dropped significantly; it was undetectable after three weeks in two animals and after four weeks in the third calf. The ChE returned to normal approximately three months after the withdrawal of the sprayed hay; it dropped again following the resumption of the sprayed hay diet. Throughout this period the animals remained clinically healthy. Examination of five samples of sprayed hay one year after phosfolan treatment revealed detectable pesticide concentrations in only one sample.

74-1232. Goldstein, J. A.; Hickman, P.; Bergman, H.; Vos, J. G. (Environ. Protection Agency, Chamblee, GA 30341). **Hepatic porphyria induced by 2,3,7,8-tetrachlorodibenzo-*p*-dioxin in the mouse.** *Res. Commun. Chem. Pathol. Pharmacol. 6(3): 919-928; 1973.* (25 references)

TCDD (2,3,7,8-tetrachlorodibenzo-*p*-dioxin), given in four weekly doses of 25 μg/kg, caused a 2,000-fold increase in accumulation of uroporphyrins, primarily 8-carboxyporphyrin, in the livers of mice. A 4,000-fold increase in liver uroporphyrin was observed at the time of death, between 17 and 30 days after administration, when a single dose of 150 μg/kg was given. Total iron content of the liver increased in both groups of treated mice, and ALA synthetase, measured in the 4 × 25 μg/kg group, increased by more than 100%. Liver weights were higher only in animals which received four weekly doses of 1 or 5 μg/kg.

74-1233. Nickerson, S. C.; Sniffen, C. J. (Author address not given). **Effects of DDT on growth and reproduction in the rat.** *Res. Life Sci. 20(19): 1-6; 1973.* (15 references)

Female Sprague-Dawley rats were assigned to the following treatment groups: (I) control; (II) olive oil supplemented; (III) DDT supplemented; and (IV) olive oil and DDT supplemented. After five weeks all of the animals were bred. The inclusion of oil in the diet significantly increased weight gain; the rate of weight gain was not significantly reduced when DDT was added to the diet. In groups I and II 60% of the females conceived, with average litter sizes of 8 and 14, respectively. In groups III and IV 40% and 20% of the females conceived; the average litter size was 13 and 16, respectively. The data indicates that DDT in the diet decreased reproductive performance and upset mating patterns. Nonpregnant animals fed diets containing DDT showed a higher percentage of cyst-like ovaries which appeared to be highly vascularized and hemorrhagic.

74-1234. Manolescu, A.; Manolescu, E. (Inst. pour le Controle d'Etat des Medicaments et Recherches Pharmaceutiques, Bucharest, Rumania). **L'importance du phenomene d'induction enzymatique pour la recherche de l'effet teratogene des medicaments. [Value of the enzyme induction phenomenon for investigating the teratogenic effect of drugs.]** *Rev. Roum. Embryol. 10(1): 53-58; 1973.* (9 references) (French)

The influence of phenobarbital and DDT on the embryotoxic and teratogenic action of cyclophosphamide was studied in pregnant Wistar rats. All animals were administered 10 mg/kg i.p. doses of cyclophosphamide on the 11th, 12th, or 13th day of pregnancy. DDT was also administered either once or daily at 100 mg/kg four days before cyclophosphamide. Fetal mortality of 86% was observed in the group administered cyclophosphamide on the 11th day of pregnancy. The surviving fetuses were normal. Preliminary treatment with DDT increased the toxic effect of cyclophosphamide, increased the fetal mortality to 100%, and caused malformations of the fetuses. The group treated with cyclophosphamide on the 12th day of pregnancy had a fetal mortality of 52% and normal and malformed fetuses. After preliminary treatment with DDT or phenobarbital, fetal mortality increased and malformation rate rose to 100%. Zero fetal mortality and a 41% fetal malformation rate were noted in the group treated with cyclophosphamide on the 13th day of pregnancy. The preliminary administration of DDT produced a fetal mortality of 57% and fetal malformation frequency over 50%.

74-1235. Ryan, S.; Bacher, G. J.; Martin, A. A. (Dept. Zool., Univ. Melbourne, Parkville, Australia). **The mussel *Hyridella australis* as a biological monitor of the pesticide endrin in fresh water.** *Search 3(11-12): 446-447; 1972.* (10 references)

Fifty-five freshwater mussels of the species *Hyridella australis* (Lamarck) were placed in a wire mesh cage and lowered into a dam in Australia; nine days later, the dam was sprayed with endrin to achieve a final concentration of pesticide in the dam of about 0.01 ppm. Although only trace amounts of endrin were found in the water, endrin in the mussels reached a tissue concentration of 0.38 ppm after 24 days; thereafter, the residues decreased to 0.05 ppm at 68 days. The endrin residues in the tissues may have been lowered by flushing out with fresh water from heavy rains. In a laboratory experiment 35 mussels were placed in a tank to which endrin was added to achieve a final concentration of 0.5 ppm. These mussels had a tissue endrin level of 3.44 ppm after 3 days. Mussels placed in a tank containing uncontaminated fresh water rapidly lost endrin from the tissues. A control group of mussels placed in the same tank of fresh water took up some of the excreted residues. The data indicates that *Hyridella* is an excellent monitor of endrin in fresh water.

74-1236. Vlahov, S.; Damyanova, L.; Gousterov, G.; Kamenova, L. (Dept. Microbiol. Virol., Fac. Biol., Univ. Sofia, Sofia, Bulgaria). **Action of simazine on the antibiotic activity of microscopic soil fungi.** *Symp. Biol. Hung. 11: 365-368; 1972.* (13 references)

Simazine reduced the antagonistic properties of soil fungi to bacteria and the number of microscopic fungi in kg samples of soil. Increasing concentrations up to 100 mg/kg and exposure times up to 7 days reduced the number of strains from 83 to 5 and the number of antagonists from 37 to 1. The inhibitory effect of simazine was more strongly expressed in the 0-5 cm depth than in the 5-10 cm depth. Fungal antagonists of *Penicillium* and *Aspergillus* were most affected by simazine; only the highest dose of the herbicide inhibited the antagonists of *Trichoderma.*

74-1237. Bakalivanov, D. (N. Pushkarov Inst. Soil Sci., Sofia, Bulgaria). **Biological activity of certain herbicides on microscopic soil fungi.** *Symp. Biol. Hung. 11: 373-377; 1972.* (8 references)

The effects of atrazine, prometryne, saminol, 2,4-D, dikotex (MCPA), afalon (linuron), cotoran (fluometuron), and semparol on five widespread species of microscopic fungi were investigated. CO_2 elimination was inhibited by atrazine, prometryne, and saminol in all species and by 2,4-D in several species. Almost all preparations inhibited respiration in *Paecilomyces varioti.* Afalon stimulated the respiration of *Penicillium funiculosum.* Dikotex stimulated catalase and urease enzyme synthesis while atrazine, prometryne, and semparol showed a tendency to inhibit these parameters. All of the herbicides having an alkaline reaction modified the pH of the medium. Some changes in pH were observed after incubation, suggesting that the herbicide altered the excretions of acids. Saminol and cotoran inhibited the mycelium development of some fungi; dichlorophenoxyacetic acid herbicides stimulated vegetative development.

74-1238. Micev, N.; Bubalov, M. (Fac. Agr. Forestry, State Univ., Skopje, Yugoslavia). **Interaction between soil microflora and herbicide agelon.** *Symp. Biol. Hung. 11: 379-384; 1972.* (6 references)

Agelon (atrazine and prometryne), applied at 3 kg/ha to maize plots, inhibited the growth of aerobic, cellulolytic microorganisms, aerobic N-fixing bacteria, and actinomycetes and stimulated the growth of aerobic heterotrophic bacteria, aerobic spore-forming bacteria, and fungi 10 days after application. One month and 10 days after application aerobic heterotrophic bacteria, aerobic spore-forming bacteria, aerobic cellulolytic bacteria, and actinomycete populations were depressed; fungi were stimulated. Two species of *Arthrobacter* isolated from the plots tolerated the herbicides and used them as sole carbon source, particularly at higher concentrations. Increasing concentrations of sugar lessened the depressive effect of atrazine and prometryne.

74-1239. Mickovski, M. (Fac. Agr. Forestry, State Univ., Skopje, Yugoslavia). **Relationship between herbicide dymid and soil microorganisms.** *Symp. Biol. Hung. 11: 397-400; 1972.*

Dymid (diphenamid), at doses equivalent to field application rates of 6 and 8 kg/ha, depressed the number of fungi present in red or alluvium soil 10 days later by about 51 and 64%. Numbers of actinomycetes, bacterial spores, and asporogenic bacteria were depressed to a lesser extent, but a dose response was observed. After two months some depression in counts was still present with both doses in both soil types. Some microorganisms grew on media with dymid as sole source of nitrogen; a few grew to a limited extent with dymid as sole carbon source.

74-1240. Manninger, E.; Bakondi, E.; Takats, T. (Res. Inst. Soil Sci. Agr. Chem., Hungarian Acad. Sci., Nat. Inst. Agr. Quality Testing, Budapest, Hungary). **The effect of gramoxone on N-fixing microorganisms.** *Symp. Biol. Hung. 11: 401-404; 1972.*

Gramoxone (paraquat) at concentrations as low as 10^{-6} mg/l. inhibited the growth of four strains of *Azotobacter* on N-free solid medium in two days. Root nodule formation and N-fixing capacity of *Rhizobium* strains were more sensitive to gramoxone using the dilution method than using agar gel diffusion. With the dilution technique, the normal application dose of gramoxone inhibited the growth of 40 strains. The most sensitive were those isolated from pea-vetch root nodules.

74-1241. Kecskes, M. (Res. Inst. Soil Sci. Agr. Chem., Hung. Acad. Sci., Budapest, Hungary). **A survey of herbicide sensitivity and resistance of *Rhizobia.*** *Symp. Biol. Hung. 11: 405-415; 1972.* (11 references)

About half of the 104 herbicides tested on 26 strains of *Rhizobium* were not toxic to all strains, but all herbicides slightly inhibited at least one strain. Fifty-one compounds considered essentially non-inhibitory included Dikotex 40 (MCPA), Cloben (neburon), and Vernam (vernolate). Thiocarbamates proved to be more inhibitory than a number of other compounds.

74-1242. Grant, W. F. (Genetics Lab., MacDonald Campus of McGill Univ., Ste. Anne de Bellevue, Quebec, Canada). **Pesticides—subtle promoters of evolution.** *Symp. Biol. Hung. 12: 43-50; 1972.* (41 references)

Although little attention has been paid to the hereditary changes and potential evolutionary changes that can be brought about by pesticides, the production of morphological and cytological abnormalities has been known for a long time. Irregularities in chromosomes and reduced seed set in tobacco were noted in 1931 after nicotine sulfate treatment. Carbamates have been used as inducers of polyploidy in plant cells; other groups have induced chromosome abnormalities experimentally.

Gene resistance and alteration of natural communities of flora and fauna are two results of pesticide use which have been observed apart from the target species. The potential for promoting evolutionary changes is signficant for many heavily used herbicides, insecticides, and fungicides.

74-1243. Balba, M. H.; Abdallah, M. D.; Zarou, M. H.; Rahal, A. (Dept. Plant Protect., Faculty Agr., Giza, Egypt). **Distribution and metabolism of DDT, carbaryl and methyl parathion in S- and R-strains of *Spodoptera littoralis* (Boisd.).** *Toxicology 1(3): 171-174; 1973.* (20 references)

Larvae representing the S- (sensitive) and R- strains of *Spodoptera littoralis* (Boisd.) were injected with LD50 doses of DDT, carbaryl, and methyl parathion to study distribution and metabolism of these insecticides. The largest amounts of both DDT and carbaryl were found in the fat and cuticle tissues. The largest amounts of methyl parathion were found in the midgut, hindgut, and fat and cuticle tissues; the distributions in the two strains were more or less similar. DDE was the only DDT metabolite recovered and was found in the fat and cuticle tissues of both strains. Similarly, carbaryl metabolism took place only in the fat and cuticle tissues, from which 1-naphthol and an unidentified compound were recovered. Methyl parathion was metabolized to *p*-nitrophenol in all tissues studied. In all cases metabolism appeared to proceed at a greater rate in the R-larvae than in the S-larvae.

74-1244. Wilbur, R. L; Whitney, E. W. (Eustis Fish. Res. Lab., Florida Game and Fresh Water Fish Commission, Eustis, FL 32726). **Toxicity of the herbicide Kuron (silvex) to bluegill eggs and fry.** *Trans. Amer. Fish. Soc. 102(3): 630-633; 1973.* (7 references)

Bluegill eggs treated three hours after fertilization with up to 10.0 ppm (acid equivalent) silvex had hatching percentages not significantly different from those of controls. Variability was great because some of the eggs were artificially ovulated and maturation was incomplete. Most of the fry in the 10.0 ppm treatment died within 12 hr of hatching, and all died within 25 hr. In the 5.0 ppm treatment 100% mortality occurred within 36 hr. Lower concentrations of silvex did not significantly affect survival of fry.

See also **74-1013** **74-1032** **74-1037** **74-1087** **74-1088** **74-1098** **74-1104**

74-1245. Kawamura, N.; Matsumoto, H.; Miyata, K.; Hayakawa, J.; Narafu, N.; Kawada, M. (Aichi Prefectural Inst. of Public Health, Nagoya City, Aichi, Japan). **[Steam distillation of residual pesticides: an improvement of the distillation apparatus.]** *Aichi-Ken Eisei Kenkyushoho (Rep. Aichi Prefect. Inst. Pub. Health) 23: 61-66; 1973.* (6 references) (Japanese)

In order to determine fat-soluble pesticide residues in food it is necessary to separate the residues from oils and fats in food samples. It has been reported by Kawai that γ-BHC (lindane) was effectively separated from fats by steam distillation. The authors tried to improve a small steam-distillation apparatus by fitting a small glass sphere on the top of the distilling flask to break the foam of the boiling liquid and by providing holes in the distilling tube end to prevent splashing from the flask and the newly fitted sphere. In using the improved apparatus, the water which was used for distillation was already found to be contaminated with BHC; it was necessary to extract the water with *n*-hexane before using to remove these residues. The amount of water distilled showed some effect on the determination. The efficiency of separation of pesticide residue from the fat was tested using constant amounts of BHC, DDE, and dieldrin in different amounts of soybean oil: 5, 1, and 0.3 g respectively. Pesticide recovery was almost complete in less than 30% of the samples for BHC, 50-100% for DDT, and more than 80% for dieldrin. The poor recovery was attributed to reabsorption of the evaporated pesticide in the oil. It was further found that the distilled residue should be re-extracted with *n*-hexane from the codistilled water.

74-1246. Goodson, L. H.; Jacobs, W. B.; Davis, A. W. (Midwest Res. Inst., Kansas City, MO 64110). **An immobilized cholinesterase product for use in the rapid detection of enzyme inhibitors in air or water.** *Anal. Biochem. 51: 362-367; 1973.*(5 references)

Improved ChE enzyme pads have been prepared for use in electrochemical cell systems which monitor either air or water for ChE inhibitors. Horse serum ChE with as little of the low-molecular-weight isoenzymes present as possible was absorbed on aluminum hydroxide gel during the precipitation of the gel from a solution of aluminum chlorohydroxide. This precipitate was suspended in a starch slurry and applied to urethane foam. Pads of the material 3/8 inch in diameter retained activity for prolonged periods and, at temperatures up to 47°, exhibited uniformity and resistance to washout.

74-1247. Kettmann, R.; Closset, J. L.; Copin, A.; Duculot, C.; Martens, P. H. (Service de Physique et Chimie physique, Faculte des Sciences Agronomiques de l'Etat, Gembloux, Belgium). **Application de la spectrometrie par reflexion totale attenuee multiple dans l'infrarouge (M-ATR) a l'identification de residus de thirame sur laitues. [Application of infrared multiple attenuated total reflection spectrometry to the identification of thiram residues in lettuce.]** *Anal. Lett. 6(11): 1013-1019; 1973.* (8 references) (French)

A preparative chromatographic procedure and the identification of thiram residues in lettuce by infrared multiple attenuated total reflection spectrometry are described. After sample extraction with methylene chloride and sodium sulfate, the extract obtained is purified on a Florisil column for subsequent elution with methylene chloride at a recovery rate of 98%. The eluate is further purified on a silica gel layer, using a hexane-acetone mixture for elution, and 2′,7′-dichlorofluorescein for visualization under UV light. The thiram-containing zone is eluted with methylene chloride, and thiram is identified by IR multiple attenuated total reflection spectrometry by means of a KRS-5 crystal. The limit of detectability is 0.5-1 ppm thiram; the currently established maximum allowable concentration is 3 ppm.

74-1248. Muthu, M.; Visweswariah, K.; Chandrasekhara, N.; Jayaram, M. (Cent. Food Technol. Res. Inst., Mysore, India). **Assay of dichlorvos concentrations in air.** *Bull. Grain Technol. 11(1): 3-7; 1973.* (9 references)

Several methods for determining the saturation concentration of dichlorvos in air were investigated. A breakdown of dichlorvos to dichloroacetaldehyde and other lower boiling compounds resulted in discrepancies between methods breakdown products were determined together in the titrimetric and colorimetric procedures, while only dichlorvos was detected by ChE assay. Bioassay results also included activity of some breakdown products, and increasing knockdown was observed as samples aged. Ethanol was found to be the best solvent for collecting dichlorvos vapor. It was concluded that values obtained by monoethanolamine hydrolysis and either titration or colorimetry could be used for saturation concentrations if reduced to 1/10.

74-1249. Anonymous. **Neuere analytische und prozessmaessige Erkenntnisse in der Wasserchemie. [Recent analytical and process findings in water chemistry.]** *Chem. Rundsch. 26(40): 5; 1974.* (German)

New analytical procedures in water chemistry, and methods for the abatement of water pollution are surveyed. Phenylurea derived herbicide residues in water are extracted with chloroform, condensed, and dissolved in acetonitrile. The chlorinated hydrocarbons are isolated by means of petroleum ether, and the phenylurea herbicides are isolated by means of a mixture of dichloromethane and carbon tetrachloride for thin-layer chromatographic determination. A new process for the radiochemical destruction of persistent chlorinated phenol derivatives, such as 4-monochlorophenol, 2,4-D, 2,4,6-trichlorophenol, 2,3,5,6-tetrachlorophenol, and pentachlorophenol, in water in the presence of oxygen has been developed. Irradiation with a gamma ray dose

of 11,000 rad resulted in total destruction and dechlorination of the chlorophenols, and in splitting of the aromatic ring into stable oxalic acid via instable peroxy compounds.

74-1250. Baluja, G.; Franco, J. M.; Murado, M. A. (Inst. of Organic Chem., Madrid-6, Spain). **Interference of phenoxyacetic acid derivatives in the estimation of monochloroacetic acid by the thioindigo method.** *Arch. Environ. Contam. Toxicol. 1(4): 375-380; 1973.* (10 references)

The thioindigo test, used for analysis of monohaloacetic acids in wines or preserved food, is based on reaction of thiosalicylic acid with the monohaloacetic acids in an alkaline medium at 100°C. After another heating at 200°C, the residue is oxidized with potassium ferricyanide to convert the thioindoxy intermediate to thioindigo which is measured spectrophotometrically at 550 nm. When this method was applied to estuarine sediments and mussels, the thioindigo color was obtained, although the presence of monochloroacetic acids in these specimens was unlikely. Purified samples of 2,4,5-T and its esters gave a color reaction in the thioindigo test, and the color formed was exponentially related to the amount of 2,4,5-T present in the solution. Thioindigo formation was attributed to cleavage of an acetate group from the herbicide under the energetic reaction conditions of the test. Due to their widespread use, phenoxyacetic acid herbicides may be present in many environmental samples, and therefore the thioindigo test cannot be applied as a specific method for monohaloacetic acid detection in such samples.

74-1251. Gorbach, S. G.; Winkler, S.; Gaudernack, E. (Farbwerke Hoechst AG, Anal. Laboratorium, Frankfurt a.M.-Hoechst, Germany). **Beitrag zur Anwendung der Gel-Chromatographie in der Rueckstandsanalyse, insbesondere am Beispiel der Bestimmung von Triazophos und Pyrazophos. [Contribution to the application of gel chromatography in residue analysis, especially on the example of the determination of triazophos and pyrazophos.]** *Fresenius Z. Anal. Chem. 267(3): 173-181; 1973.* (6 references) (German)

The clean-up of ethylacetate extracts of food samples with the aid of liquid chromatography on polystyrene gel for the determination of triazophos, pyrazophos, binapacryl, DDT, quintozene, and ethyl parathion residues is described. Thirty-one ripe common crops including apples, cotton seeds, beans, cabbage, peas, cucumbers, hop, carrots, potatoes, corn leaves and cobs, morello cherries, celery leaves and roots, currants, tomatoes, grapes, sugar beets, and onions were used. Following extraction with ethylacetate, gel-chromatographic separation on 50-60 micron polystyrene gel was performed. With a few exceptions, including onions, the pesticide residue could be determined directly in the eluate by gas chromatography using the electron capture or the flame photometric detector. It was possible to determine triazophos and pyrazophos directly from the ethylacetate extracts without gel chromatography in apples, peas, cucumbers, carrots, celery bulbs, sugar beets, and sugar beet leaves. Impurities not separated by gel chromatography and interfering with the determination by flame photometric detector were separated by an additional purification step with Nuchar-Attaclay. The rate of triazophos recovery from apples, cotton-seed oil, beans, soil, carrots, potatoes, corncobs, grapes, and sugar beets was 100%, 80%, 100%, 92%, 77%, 88%, 87%, 93%, and 82%. The recovery rates for pyrazophos from red currants and Brussels sprouts were 74% and 90%, respectively.

74-1252. Weil, L.; Frimmel, F.; Quentin, K. E. (Inst. fuer Wasserchem., Chem. Balneol., Techn. Univ. Muenchen, D-8000 Munich 70, Germany). **Kombinierte Gas-Chromatographie/Massenspektrometrie—eine hochempfindliche und spezifische Identifizierungsmethode. [Combined gas chromatography/mass spectrometry as a specific identification method of high sensitivity.]** *Fresenius Z. Anal. Chem. 268(2): 97-101; 1974.* (6 references) (German)

An improved mass specific identification method is described. Additional information to gas chromatographic data is derived from special peak groups of the mass spectrum. How to choose the peak groups is shown by the examples of hexachlorobenzene and lindane. The importance of the mass spectroscopic method of peak group specificity lies in a reliable identification even of substances which cannot be separated properly by gas chromatography. (Author abstract by permission).

74-1253. Reichling, U.; Egger, K. (Botan. Inst., Univ. Heidelberg, D-6900 Heidelberg, Germany). **Chromatographie von Organophosphorsaeure-Insecticiden auf Duennschichten von basischem Zinkcarbonat. [Chromatography of organophosphorus insecticides on thin layers of basic zinc carbonate.]** *Fresenius Z. Anal. Chem. 268(2): 124-126; 1974.* (12 references) (German)

Thin layers of basic zinc carbonate can be used with good results to separate organophosphorus pesticides. With a petroleum ether/acetone mixture (between 98:2 and 86:14) good *Rf* values and clearly defined spots are obtained. The substances are either recognizable in short-wave UV light, when the fluorescence indicator F254 (Merck) is added to the layer, or in daylight after spraying with a solution of Pd (II)Cl_2, which leads to the formation of reddish-brown spots. The pesticides can be eluted quantitatively with acetone; the separation can also be carried out by means of column chromatography. The effects of separation are similar to those obtained on silica gel, but basic zinc carbonate has the advantage of lower chemical activity, which means that fewer artifacts are formed. (Author abstract by permission)

74-1254. Molozhanova, Ye. G.; Remizova, L. B. (All-Union Sci. Res. Inst. Hyg. Toxicol. Pesticides, Polymers, Plastic Materials, Kiev, USSR). **Metod odnovremennogo opredeleniya v pochve mikrokolichestv pestitsidov razlichnykh grupp. [Method for simultaneous determination of trace quantities of pesticides from various groups in soils.]** *Gig. Sanit. 38(11): 74-75; 1973.* (3 references) (Russian)

A thin-layer chromatographic method for the separation and quantitative determination of trace quantities of pesticides belonging to different groups such as carbamates (carbaryl and its metabolites) and organophosphates (phosalone, dimethoate, and tetrachlorvinphos) in the soil is described. The pesticides are extracted from air-dry soil by means of *n*-hexane or chloroform, after which the extracts are transferred onto alumina layer in a mixture of 5:4:1 ratio of chloroform, hexane, and acetone for the separation of the different groups of pesticides. Visualization is done by means of diazotized sulfanilic acid. Quantitative determination of carbaryl and organophosphates is done by comparison of the coloration with that of a standard solution, and quantitative determination is done against a calibration curve. The rates of recovery of carbaryl, phosalone, dimethoate, and tetrachlorvinphos were 98%, 93%, 90%, and 75%, respectively. The sensitivity was 0.5 μg for carbaryl and its metabolites, 1 μg for phosalone, and 10 μg for tetrachlorvinphos.

74-1255. Pukach, L. P.; Maksimov, G. V. (S. M. Kirov Medico-Military Acad., Clin. Field Therapy, Leningrad, USSR). **Diagnostika ostrykh peroral'nykh otravleniy khlorofosom s pomoshch'yu piridinovoy proby. [Diagnosis of acute oral poisoning from trichlorfon by means of the pyridine test.]** *Lab. Delo 9: 552-554; 1972.* (4 references) (Russian)

Diagnosis of acute oral poisoning with trichlorfon by means of the rapid pyridine test is described. Vomitus, lavage fluid, urine, and blood serum are suitable media for the pyridine test. The sample to be analyzed is combined with pyridine and potassium hydroxide. The presence of trichlorfon is indicated by the pink coloration of the pyridine layer during boiling in a water bath. Although the pyridine test is sensitive to chlorinated hydrocarbons, such as chloroform and dichloroethane, organophosphorus pesticides other than trichlorfon (e.g., parathion, malathion, and methyl parathion) fail to give a positive reaction in the pyridine test. Trichlorfon was determined in urine samples taken 2 to 4 days after poisoning, indicating prolonged circulation of trichlorfon in the body.

74-1256. Zimmerli, B.; Marek, B. (Eidgenoessisches Gesundheitsamt, Sektion Pestizidrueckstaende und Kontaminationen, Switzerland). **Entwicklung einer gaschromatographischen Bestimmungs- und Bestaetigungsmethode fuer Hexachlorbenzolrueckstaende in Fetten und Oelen. [Gas chromatographic method for the determination and confirmation of BHC residues in fats and oils.]** *Mitt. Geb. Lebensmittelunters. Hyg. 63(2): 273-289; 1972.* (25 references) (German)

A rapid gas-liquid chromatographic method for the determination and confirmation of BHC residues in fatty and oily foods is described. Following saponification of the fat with alcoholic potassium hydroxide and subsequent direct clean-up on a small Florisil column, the BHC is determined by means of gas-liquid chromatography with an electon capture detector; recovery is 92%. The formation of pentachloroanisole from BHC by treatment with methanol-sodium hydroxide-pyridine mixture was used as a confirmation method. With this treatment the pentachloroanisole formed amounted to about 90% of the BHC present. The limit of detection for both BHC and pentachloroanisole is about 1 ppb. Pentachloronitrobenzene, forming 2% of BHC during saponification, may interfere with the determination.

74-1257. Stijve, T.; Cardinale, E. (Control Lab., Nestle Products Tech. Assistance Co. Ltd., 1814 La Tour de Peilz, Switzerland). **Confirmation of identity of heptachlor residues by hydroxy derivatization on thin-layers of aluminum oxide.** *Mitt. Geb. Lebensmittelunters. Hyg. 63(2): 308-310; 1972.* (5 references)

A recently developed simple procedure for the identification of heptachlor can be used on extracts of foodstuffs prepared for multi-residue analysis. The cleaned-up extract was spotted on a thin layer of neutral aluminum oxide, along with heptachlor standard, and heated 45 min in a 60° oven to convert the heptachlor to 1-hydroxychlordene. The converted material was extracted into benzene and analyzed by GC. DDT, TDE, DDE, BHC, HCB (hexachlorobenzene), PCNB, aldrin, dieldrin, endrin, heptachlor epoxide, and the chlordane isomers did not interfere with the assay. When large amounts of polychlorinated biphenyls or naphthalenes were present, TLC and visualization with silver nitrate were substituted for the GC. The limit of detection for 1-hydroxychlordene was 25-50 ng.

74-1258. Ortner, G.; Heinen, H. (Farbenfabriken Bayer AG, Leverkusen, Germany). **Beitrag zur Analytik der Dithiocarbamate. Eichung von Apparaturen zur Schwefelkohlenstoff-Abspaltung mit Zinkdiaethyldithiocarbamate. [Analysis of dithiocarbamates—calibration of apparatus for splitting off carbon disulfide with zinc diethyl dithiocarbamate.]** *Nachrichtenbl. Deut. Pflanzenschutzdienstes 25(7): 104-106; 1973.* (2 references) (German)

A new method is described for the calibration of apparatus designed for the determination of dithiocarbamates and thiuram derived pesticides (e.g., thiram) through splitting off carbon disulfide. The use of sodium diethyl dithiocarbamate trihydrate for calibration of apparatus for the determination of carbon disulfide, as

recommended by CIPAC, results in too high a nominal value when performed by iodometric titration due to the strong pH dependence of the end point. Zinc diethyl dithiocarbamate was more appropriate and gave better results than sodium diethyl dithiocarbamate as a reference substance for calibration.

74-1259. Mayer, R. (Hygiene-Institute Dresden, Abt. Lebensmittel- und Ernaehrungshygiene, 8020 Dresden, Reichenbachstrasse 71/73, DDR). **Duennschichtchromatographischer Nachweis einiger alkylierender Phosphorsaeureester mit 4-(*p*-Nitrobenzyl)-pyridin (NBP) und Piperidin. [Thin-layer chromatographic determination of some alkylating phosphoric acid esters with 4-(*p*-nitrobenzyl) pyridine (NBP) and piperidine.]** *Nahrung 17(4): 527-528; 1973.* (6 references) (German)

A thin-layer chromatographic method for the detection of demephion and dimethoate, systemic alkylating organophosphate pesticides, as well as their metabolites (demephion sulfone, demephion sulfoxide, and PO-dimethoate) in plant materials is described. Silica gel G, 68:32 ratio of chloroform and acetone as mobile phase, and an equal volume ratio of piperidine and dimethyl formamide along with 4-(*p*-nitrobenzyl)-pyridine were used for the determination. Detection was done with a 2% solution of NBP in acetone and acetate buffer at pH 4.7 (0.05 *M*). The developed plate was heated for 25 min at 150°C and sprayed with a mixture of piperidine and dimethylformamide. The residues appeared in the form of dark blue spots which faded after a certain time, thus requiring repeated spraying. The sensitivity following one spraying was determined to be 50 ng for demephion; 10 ng for demephion sulfone, demephion sulfoxide, and PO-dimethoate; and 5 ng for dimethoate.

74-1260. Woggon, H.; Jehle, D. (Forschungszentrum fuer Molekularbiologie und Medizin, Zentralinstitut fuer Ernaehrung, Potsdam-Rehbruecke, DDR). **Zur inversvoltammetrischen Bestimmung von bioziden Organozinn-Verbindungen. [On the determination of biocidal organotin compounds by the anodic stripping method.]** *Nahrung 17(7): 739-748; 1973.* (10 references) (German)

Determination of organotin fungicides and their metabolites by an anodic stripping method is described. A combination of liquid-liquid extraction, thin-layer chromatography, and an anodic stripping method permits the simultaneous determination of tri-, di-, and monoalkyl or aryl tin compounds. Extraction of bis-(tributyl tin) oxide, tributyl tin chloride, and triphenyl tin chloride with cyclohexane affords recovery rates of 94.5%, 84.4%, and 100%. The extracts are irradiated with UV light and treated with UV light on the thin layer for chromatographic determination. The limit of detectability is 0.01 ppm of tin for the anodic stripping determination following UV irradiation and elution with hydrochloric acid.

74-1261. Sato, Y.; Fukui, S.; Sugano, S. (Kanagawa Prefectural Center of Public Nuisance Research, Yokohama, Japan). **[A method of determination for sulfur-containing organophosphorus pesticides by gas chromatography with FPD.]** *Nippon Koshu Eisei Zasshi (Jap. J. Pub. Health) 20(10S): 409; 1973.* (Japanese)

A gas chromatographic method using two detectors, one for P, and the other for S, was devised for qualitative and quantitative determination of sulfur-containing organophosphorus pesticides. First two calibration curves were obtained, respectively for sulfur and phosphorus, using 10, 20, and 50 ppm of methyl parathion standard solution. Then, the peak areas of the gas chromatogram obtained with the standard methyl parathion solution were compared to the calibration curves to obtain the molar ratio of S/P. For identification, the retention time was utilized; for confirmation, the coincidence of the specimen S/P ratio with the standard S/P ratio. For quantitative determination, the peak area obtained for phosphorus in the specimen was referred to the calibration curve for phosphorus to obtain the molar concentration of P, μMole/ml. The condition which was most influential was the carrier gas flow: hydrogen at 200 ml/min. Methyl parathion was selected as the standard because of the availability of pure specimens.

74-1262. Thompson, L.; Jr.; Long, J. W. (Dept. Agron., Univ. Kentucky, Lexington, KY). **Determination of herbicides in tobacco and their influence on various constituents of tobacco.** *In: Proceedings of the Tobacco and Health Workshop Conference No. 3. Tobacco and Health Research Institute, Lexington, Kentucky, Jan. 11-13, 1972, pp. 333-334.*

Experiments are in progress to determine the residues and metabolic fate of three field-applied herbicides and any changes induced in health-affecting constituents of tobacco. Benefin will be extracted from tissue with methanol, partitioned into methylene chloride, and chromatographed on florisil. Diphenamid will be extracted with acetone, partitioned into benzene, and chromatographed on florisil. Pebulate will be extracted by steam distillation and partitioned into isooctane. Diphenamid and pebulate will be analyzed by flame ionization GC, while electron capture GC will be used for benefin.

74-1263. Bhavnagary, H. M.; Ahmed, S. M.; Gupta, M. R. (Discipline Infestation Control and Pesticides, Central Food Technol. Res. Inst., Mysore, India). **A new colorimetric method for the microdetermination of pyrethrins.** *Res. Ind. 18(1): 21-23; 1973.* (5 references)

A new colorimetric method for the microdetermination of pyrethrins in the presence of pyrogallic acid, an antioxidant, and other adjuvants is described. The pyrethrins are treated in specific solvents with sulfuric acid to give a stable brownish yellow solution after heating in a water bath for 10 min. The color is

measured at 263 nm. The method is sensitive up to 1 μg of pyrethrins. Sulfuric acid in a concentration range of 90 to 98% can be conveniently used for the color estimation. Hexachlorocyclohexane, lindane, and aldrin did not affect the color reaction, whereas endrin, malathion, and DDT interfered in the color development. The results obtained using this method agreed satisfactorily with those obtained using the orthophosphoric acid-ethyl acetate method.

74-1264. Mestres, R.; Tourte, J.; Cornet, R. (Lab. Chimie Appliquee a l'Expertise, Fac. de Pharmacie, Montpellier, France). **Note sur le dosage des residus de dithiocarbamates en presence de produits cupriques. [Determination of dithiocarbamate residues in the presence of copper compounds.]** *Trav. Soc. Pharm. Montpellier 33(2): 191-194; 1973.* (6 references) (French)

A colorimetric method for the determination of dithiocarbamates in the presence of copper compounds in wine and grape juice by the modified Keppel method is described. The sample to be investigated is directly hydrolyzed in hydrochloric acid in the presence of tin chloride and potassium iodide. The carbon disulfide liberated from the dithiocarbamate is absorbed by an alcoholic solution of copper acetate and diethylamine. The coloration is measured at 435 nm. The addition of potassium iodide in the distilling flask prevents the inhibition by cupric ions of carbon disulfide liberation. The color reaction is sensitive for a minimum of 0.01 mg of carbon disulfide or 0.015 to 0.02 mg of dithiocarbamate. Dithiocarbamate concentrations exceeding a lower limit of 0.4 mg/l. can be detected by the colorimetric method.

74-1265. Mestres, R.; Bouco, L.; Espinoza, C. (Lab. Chimie Applique a l'Expertise, Fac. de Pharmacie, Montpellier, France). **Residus de pesticides. Recherche et dosage des residus de dichlozoline dans les raisins, le jus de raisins et le vin. [Pesticide residues. Detection and determination of dichlozoline in grapes, grape juice, and wine.]** *Trav. Soc. Pharm. Montpellier 33(2): 195-200; 1973.* (4 references) (French)

A simple procedure for the detection and quantitative determination of dichlozoline [3-(3,5-dichlorophenyl)-5,5-dimethyl oxazolidine 2,4 dione] in grapes, grape juice, and wine by gas chromatography with electron capture detector is described. Homogenized samples are combined with anhydrous sodium sulfate, celite, and purified petroleum ether or purified hexane for extraction. The elimination of natural substances and concentration of the extract are unnecessary as long as the pesticide level is above 0.25 mg/kg. Below this level, further purification by chromatography on Florisil is necessary. Stationary phases such as 6% QF, 10% DC 200, 5% SE 30, and 10% (DC 200 + QF 1); pyrex columns; and column temperatures of 180-200°C are used for the chromatographic determination. The sensitivity of the method is 0.2 mg/kg for grapes and grape juice and 0.1 mg/l. for wine at an extract volume of 100 ml. The corresponding figures for extract volumes of 10 and 5 ml are 0.04 mg/kg and 0.01 mg/kg in grapes and grape juice and 0.02 mg/l. and 0.005 mg/l. in wine, respectively.

74-1266. Mestres, R.; Causse, C.; Im Udom, V. (Fac. de Pharmacie, Lab. Chimie Appliquee a l'Expertise, Montpellier, France). **Etude de la recherche par chromatographie gazeuse des pesticides azotes. [Gas-chromatographic study of nitrogen-containing pesticides.]** *Trav. Soc. Pharm. Montpellier 33(2): 233-246; 1973.* (12 references) (French)

Some aspects of the extraction of nitrogen-containing herbicides and the cleanup of their extracts for gas-liquid chromatography are discussed, and the the use of the Coulson electrolytic detector for the analysis of these compounds is described. Following extraction with a mixture of petroleum ether and diethyl ether, the different herbicide residues are separated on a column packed with 2% Reoplex 400, Gas Chrom 80/100 mesh, 10% SE30, or Florisil. The column temperature should not exceed 185°C when Reoplex is used. Florisil is suitable for the recovery of propanil, prometryne, and 3,4-dichloroaniline. Extraction with acetonitrile or ammonia should be avoided or should be followed by triple washing. While extraction is equally possible in neutral, acid, or ammoniacal media, acidification is indicated for reducing the extraction of natural nitrogen-containing components, while alkalinization is necessary to facilitate the extraction of mercapto-*s*-triazines. The retention times are related to that of 3,4-dichloroaniline. Actual gas chromatographic analyses of propanil residues in model waters and in propanil-treated rice fields revealed spontaneous and rapid hydrolysis of propanil into 3,4-dichloroaniline at normal temperature and in neutral medium. The half-life of propanil and the amine residues is about 1.5 days.

See also **74-1032** **74-1037** **74-1060**

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